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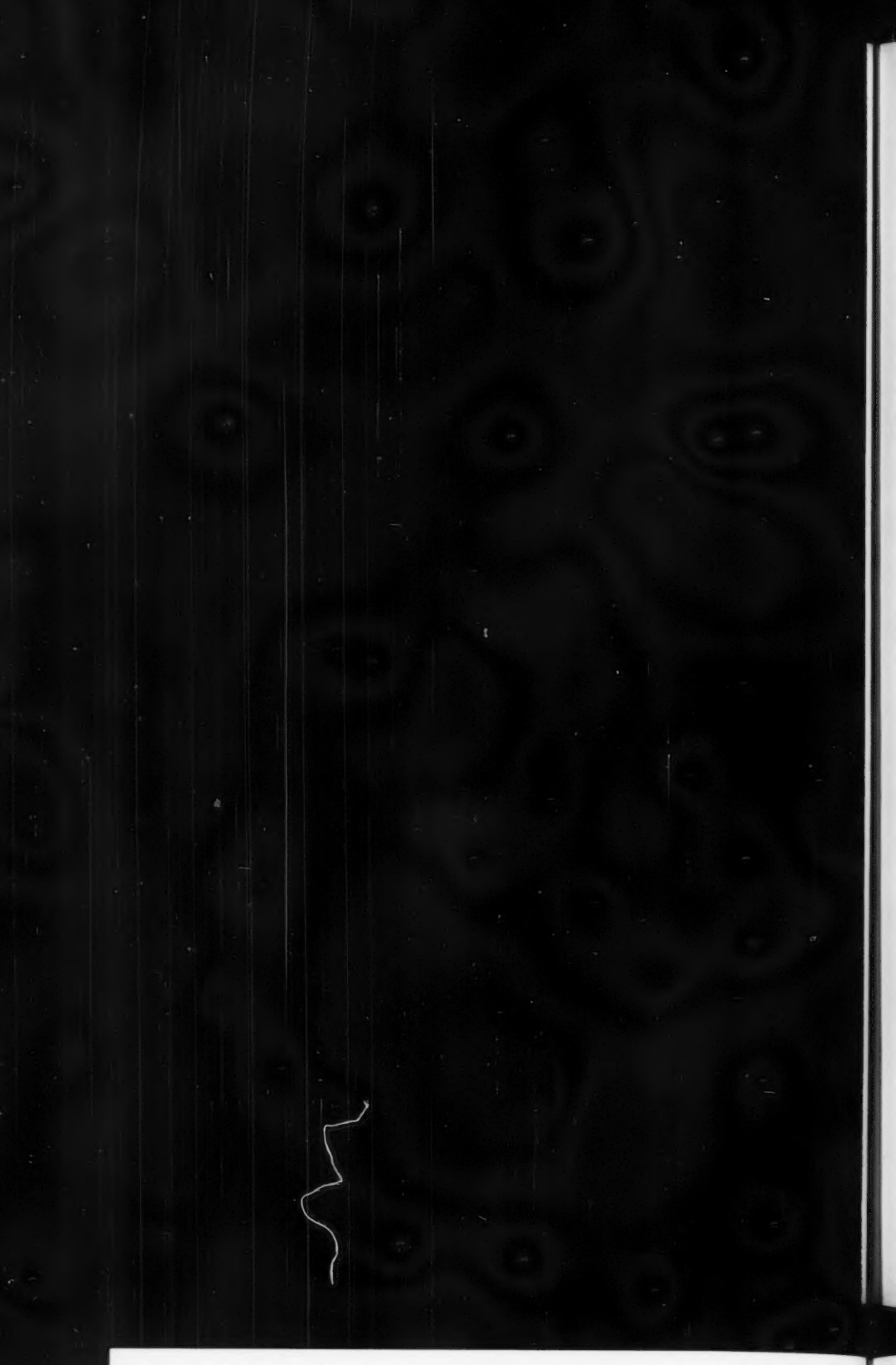


BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. XII JANUARY 1941 No. 1

FOWLING IN HOLLAND

BY JOOST TER PELKWYK

HOLLAND is singularly rich in birds. The country, built up by the Scandinavian glaciers, by the French and German rivers, and, to be sure by the Dutch themselves, is rich in shelter such as dunes, wet pastures and marshes. Even in the coldest month, January, the average temperature does not drop below freezing. This means that birds find safe winter lodging here. The country is also favorably situated for the autumn migration of land birds.

In the life of the Hollanders, birds take a considerable place. Their capital has a stork for its emblem and the gift of the first egg of the lapwing to the Queen used to be a national event every spring. The catching of birds and the gathering of eggs once were important means of existence for the inhabitants of the Low Countries. Catching ducks in duck-ponds, falconry and fowling reached a greater perfection in Holland than elsewhere.

The present century brought to Holland, as to America, increased regard for nature and bird protection. The well observed bird-laws of 1912, 1933 and 1936 make these old professions practically impossible. Until 1912 catching small birds for food was allowed. Skylarks, finches and starlings used to be caught on fowling-yards in considerable numbers and brought a good price. The birds were killed by crushing the heads and the necks pinched between two halves of a cleft willow twig. After every ten finches a ring was pushed around the twig. Fifty finches made a "rits", used as a trophy by the fowler or sold to the poulterer for 80 cents apiece.

It will not be long before the art of fowling, so extremely popular in Holland in the sixteenth and seventeenth centuries, will belong to the past. Then a treasury of knowledge, centuries old and orally delivered, will be lost. Fortunately in recent years some bird-yards have found a new occupation by catching birds for banding. In the bird-yards near Wassenaar, Monster, Harderwijk and De Koog, thousands of birds have been banded and released. I have spent marvelous mornings on these bird-yards enjoying the ancient thrill of the fowler while banding. I cannot refrain from telling some of the technical knowledge I learned from "Uncle Dirk" (Mr. D. Hoos),

who has his yards near Monster. I hope it will give the American birdbanders some suggestions.

Most of the fowling-yards in Holland are more or less permanent institutions which for generations have levied an annual toll on the stream of migrating birds. Establishing a new fowling-yard requires thorough preparation. To fix the right spot for the yard one must be well acquainted with the behavior of the birds in the environment. The behavior of migrating flights of birds usually follows a fixed pattern. The topography causes concentrations of migrants over and over again on the same spots. For succesful fowling rather treeless surroundings are most suitable.

As soon as we have found the proper place for the new yards, we begin with building the fowler's-shed. This cabin must not be too small, for we want room to store nets and cages overnight. And don't forget a little stove to boil coffee and to warm yourselves and the birds on chilly mornings. Eight feet square is an average size for a shed. In the walls we make horizontal peepholes that can be closed from within.

In a northwesterly direction (the prevailing direction of the wind being southwest), not more than thirty feet from the cabin, we lay out our main-yard, the "Druip" (Fig. 1). Along the south side of the druip we make a dike, covered with green turf and about three feet high. On top of this dike we plant a row of dead branches. The highest branches must be planted at the farthermost end of the dike, just where it curves around the yard. This part of the yard has the peculiar name of "Helletje" (little hell). At the east side we make another dike, not quite as high as the first one and without branches on top. This dike is bordered on the outside by a wooden shelter carrying a series of caged decoys. Surrounded by little dikes our yard is now an oblong lawn sheltered from the wind. On this lawn we lay out our nets. I never have fowled with a druip of more than thirty-five feet. In the old days these yards used to be as much as twice that length.

In addition to the druip-net we spread two "Open Netten" (open nets). These are about ninety feet from the cabin on flat parts in the meadow. The open nets are designed to catch field-birds such as starlings, larks and buntings. We place these nets as far as possible from the wood of the druip. The reason for this is that a number of birds have the habit of staying in a flock as long as they are in the field. We can then catch the whole flock at once in an open net. In the druip however, this might take considerably more time, for in the branches flocking is less pronounced and we have to catch the birds one by one.

FIG. 1. Airview of a Dutch fowling-yard. In the middle the shed, at the right the druip, at the left the flight-door, in the foreground the open nets. Scattered in the field cages with decoy-birds.

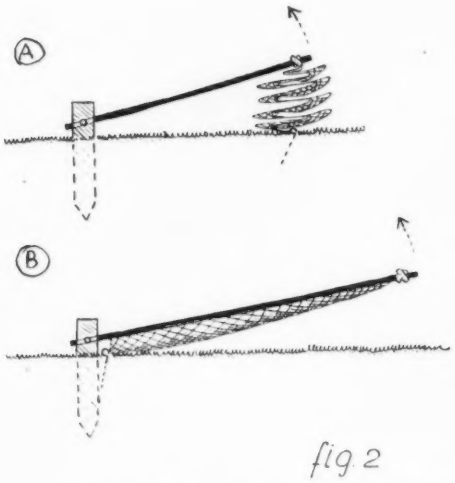


FIG. 2. Schematical cross-section of one of the doors of the druip (A) and of the open net (B).

All these nets consist of two "doors". Each door is an oblong net especially made for the purpose. The net is extended on two wooden bars at each end hinging in notched stakes, which have been driven intothe ground. An elastic rope, stretching over the ends of the wooden bars acts as a spring. We have only to pull slightly on the rope leading to the cabin to make both doors close. The druip has to be made out of rather heavy material, for it is subjected to much wear and tear. The other nets are less heavy and the meshes are larger to make them close quicker. Besides, these nets are broader than the druip; generally they are about five feet wide. The druip differs moreover from the open nets by the doors being folded in rest. As in the case of other nets one longitudinal side of the door is attached directly to the ground by curved iron pins (Fig. 2).

A fourth type of net can only be used with strong west or south-west winds, which cause the flocks of birds to migrate very close to the ground. The net is extended crosswise to the direction of the wind. If the rope is pulled, the wind catches the net so that it is suddenly closed, trapping the birds, that skim the ground. This is the only net, that can be used without decoy-birds, for if the birds migrate so close to the ground they do not react to other birds.

Possibly still more important than the right nets are good decoy-birds. In the choice of our decoy-birds we act on the principle of "like loves like." The greater the variety of our decoy-birds, the greater the chance for some variation in our catch. The decoy-birds are placed in cages all around the yard. It is important to shelter the birds against cold wind, so that they are as cheerful and noisy as possible, for it is their notes that attract the wild birds to the nets. All cages are sheltered by a little board at one side (Fig. 3). If they are placed on the ground near the nets, they are protected by a sod. Only a few birds are displayed in cages near the nets. Fowlers believe that for wild birds the sight of a bird in a cage is disagreeable. "Lopertjes" (runners) are better for this purpose. These birds are seemingly free, but under the feathers they wear a "Broekje" (shorts). These shorts are made out of old kid gloves and do not harm the birds (Fig. 4). Decoy-birds walk around in shorts for a whole season. By means of a string the shorts can be fastened to the ground. One or two decoys are fastened to the "seesaw", a twig, that can be drawn up by the man in the shed. The birds in "shorts" have to be trained to behave themselves as the fowler wishes and to hover nicely if the swing is moved (Fig. 5).

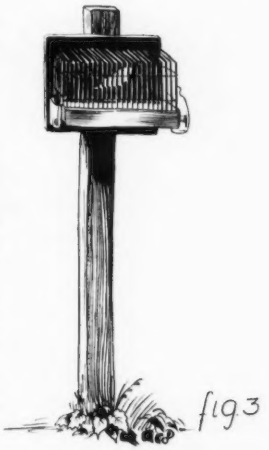
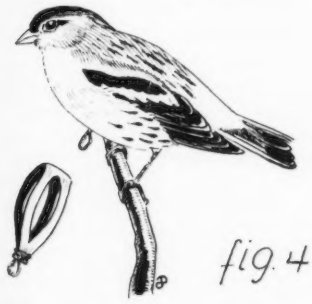


FIG. 3. Cage with decoy-bird in the field.



For a good catch in autumn it is desirable to "Muit" part of the decoy-birds. This is an artificial process by which we cause the birds to sing in full voice in the autumn. Song seems to be much more attractive for migrants than the call note alone. Most Fringillidae can be used for the muit. Only a few species are decidedly unfit as is the redpoll (*Carduelis flammea*) which loses the clearness of its voice in summer.

FIG. 4. Siskin (*Carduelis spinus*) in "shorts". The harness is slipped around the body, the wings and legs protuding through the slits.

FIG. 5. Starling on the seesaw.

The muit begins early in May when the birds sing freely. We choose only males, which have been accustomed to captivity for some time and which are in first-class condition. We bring these birds within their cages into a special closet. In this closet the birds must have plenty of air, but we must be able to change the quantity of light. In the course of about two weeks we decrease the amount of light gradually until the birds live all day long in twilight. It is necessary to watch all birds carefully so that the process does not hurt their health. Birds in the muit require much more care than birds under normal light-conditions. We keep the birds in twilight all summer long. All their activities are slowed down, even the molt. At the end of August we gradually give them more light and finally bring them out in the open. Then they will resume their song. We have to be very careful in using these decoys outdoors. In dry weather they sing well, but rain can stimulate the molt and if the molt begins, the song is gone. Sometimes we may succeed in stimulating the molt in June by moistening the birds carefully. Then we may have in September decoy-birds molted and singing, an ideal combination.

In the early days many birds, especially chaffinches (*Fringilla coelebs*) and linnets (*Carduelis cannabina*) were blinded to obtain a more prolonged song by removing external distractions. The eyelids of the birds in the muit were carefully seared together with a hot needle. Behind the lids the eyes remained undamaged but the birds were unable to distinguish form. It was possible to loosen the eyelids afterwards by treating them for some days with unsalted butter. Of course some people bungled in blinding and the abhorrence for this method is justified. But, for fowling this blinding was very useful. Both chaffinch and linnet will stop singing and give the call note as soon as they see birds of their kind. Covering the cage has, however, the same effect as blinding.

Most of the decoy-birds are caught some time before use. The best decoy-birds, however, especially among shy species, are those we have raised from the nest. We must bring the young birds home at the right moment. If we are too late, the birds will become shy after a while and they will stay just as shy as wild birds. The Dutch fowlers consider it the right moment if the baby-birds have just strength to rise for a while on their own legs. The birds are brought home in the nest and are left in the nest, which may be placed in an old flowerpot. The best way to feed them is with a flat wooden spoon. The fowlers use as food for all kinds of baby-birds a doughy mixture of bread and egg or some soaked egg-cake. After the birds are accustomed to this diet we begin with tid-bits such as fresh ant-pupae, small pieces of worms and flies. Some fine-cut stinging nettle or chickweed is considered to be very good. When the young are old enough so that they can go to roost in their cage we may begin to give them seeds. To distinguish male Chaffinches from females we pull out as early as possible a few breast-feathers. The males replace these with cinnamon colored feathers. The females are released. It is important to teach the males a good song. "Rebabbelaars", males with a song of inferior quality, have to be kept away from the young, for they spoil the song of the young birds long before these begin to sing. As adults the hand-raised birds are treated exactly as the other decoys. Sometimes they cannot be used so well for the muit.

About the peculiarities of each individual species and even subspecies a trained fowler can give a wealth of interesting data. He can use his fowling-yard almost every morning between September 1 and May 1, if weather is favorable. Still and hazy weather are the worst. Most species have their special season and their favorite weather. Only the crossbill (*Loxia curvirostra*) and the shore-lark (*Eremophila alpestris*) appear and disappear most unexpectedly.

The druip can be used most of all the nets. The bird most frequently caught here is the siskin (*Carduelis spinus*), once a very popular cage-bird. Siskins are attracted by a number of decoys around the yards and by few "runners" on the nets and mostly one decoy on the seesaw. In addition, the net offers water and some food, especially some fruiting branches of the alder. Insect eating birds cannot be attracted so well with decoys. A mealworm fastened on a pin is a fine bait. We may use the peculiar habit of the snowbunting (*Plectrophenax nivalis*) which loves a shelter behind a sod by bringing some sod in the open nets.

For banding, starlings (*Sturnus vulgaris*) are especially in favor. We catch them with an open net. Ordinarily two runners are used and one starling is sitting on the seesaw. It is very important here that our decoy-birds behave themselves in the right way. It is

unfortunate if cows come near the yard for then the flocks of starlings break up after they come down.

Catching skylarks (*Alauda arvensis*) is very similar. Here we employ only one runner and one bird on the seesaw. With a homemade flute we try to imitate the skylark's callnote. If our imitation is not too poor, the migrating larks will ordinarily stop and come down. Early in spring we may have trouble with a skylark that happens to establish his territory on our yards. Other birds, however, have the same bad habit. They drive away all of their own kind and we would not catch a single bird if we left him alone. It is best to catch him as soon as he begins to fight with one of the decoy-birds.

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THE INVASION AND WING MEASUREMENTS OF THE EASTERN PURPLE FINCH AT ARDMORE, PA., DURING THE SPRING OF 1939

By HORACE GROSKIN

THE Ardmore banding station is located in southeastern Pennsylvania, about 11 miles from the center of the City of Philadelphia. The banding record of the Ardmore station for the year 1939 is as follows: species banded 29; number of birds banded 2,189; repeats 1,670; returns 56; foreign bands 14; making total captures, or birds handled, for the year 3,929.

The largest number of any species banded during the year was the Eastern Purple Finch (*Carpodacus p. purpureus*). Of this race, 1,372 were banded during the year, and of this number 1,146 were banded between February 10th and May 15th, while more than 1,000 of these birds were banded in a six-week period between March 15th and April 30th, which was the peak of the Purple Finch invasion in this region.

The Ardmore station is adjacent to about 35 acres of deciduous woodland with a brook at its westerly edge. The banding equipment at the station consists of 12 traps as follows: a large pull-string flat trap, two modified Government sparrow traps, two Chardonneret, three false bottom types, three Potter types and one automatic tree trap. All traps are located within 100 feet of the residence, and during the winter and early spring months, the traps are moved to within a few feet of the house.

In order to attract as large a volume of birds as possible, bait is not only used freely in the traps, but food is also placed in eleven feeding devices where birds may secure food without being trapped.

Of course the traps also become free feeders when they are not in operation. The bait used consists mainly of the usual seed mixture, hemp, millet, cracked corn and sunflower seeds, as well as bread crumbs, white bread, peanuts, apples, raisins, grapes, and various berries, depending on the season of the year. Purple Finches, during the season at Ardmore, preferred sunflower seeds.

The number of Purple Finches banded at the Ardmore station does not fully represent the extent of the invasion at Ardmore and vicinity for large numbers of Purple Finches were always present at the feeders and about the station that passed through without being captured. This was due to the limited capacity of the traps and the fact that the traps could not be emptied soon enough and often enough to make possible the capture of additional birds. It was physically impossible for one working alone to handle any considerable number greater than was captured, considering the additional time required for measuring wings and other investigations in addition to banding. At least 500 additional Purple Finches might have been banded during the invasion at Ardmore had there been adequate facilities to capture the birds that were present.

Other species were also banded during this period, including 160 Northern Pine Siskins (*Spinus p. pinus*), which appeared to be associated with the Purple Finch in the spring migration.

According to the 1931 Edition of the A. O. U. Check-List, the Eastern Purple Finch does not breed in Pennsylvania, but Pennsylvania is within its winter range. The season at Ardmore, begins about the last week in October and ends about the middle of the following May. Of the 1,146 Purple Finches banded during the invasion, 450, about 39%, were adult males, and 696, or about 60% were olivaceous females and young. The largest number banded in a single day was 75 on March 25th, and the same number again on March 29th. On the former day the largest number of captures of Purple Finches was made; 75 banded and 22 repeats, making a total of 97.

During the two-week period between March 16th and March 31st, 482 birds were banded, and during the following two-week period between April 1st and April 15th, 380 birds were banded, making a total for the four weeks of 862 birds banded, or 75.22% of the entire number. If we include the following two-week period, April 16th to April 30th, making six weeks in all, 1,025 birds were banded, representing 90% of the entire 1,146 banded from February 10th to May 15th, 1939.

It is interesting to note that 450, or 39.27% of the 1,146 banded, were rosy adult males. This large percentage of rosy males is contrary to the general opinion that the ratio is one rosy to two olivaceous. The fact that 450 rosy males, or close to 40% of the total, were actually banded, may easily be misleading as to the true

ratio, if one fails to consider that they were captured during an abnormal period in an invasion which was brought about by special causes at present unknown.

It has become a matter of interest to learn what is the length of stay of migratory species at their resting or feeding stations while on their journey. Repeat data at banding stations offer information along this line. It should be borne in mind that these data present the known length of stay and not the actual time the birds remained. It is possible that many birds remained much longer than the records show, but all repeating birds stayed at least as long as the record shows they were repeating. The reason the information cannot be more exact is that it is not possible to secure these data even through the banding method of investigation. It is not possible to learn the length of time the bird was present at the station before it was captured, nor is it possible to know how long it remained after its last repeat. If it does not repeat at all after being banded, there is no way of learning whether or not it remained at the station or vicinity, and if it did remain without repeating, we cannot know the length of time it remained. Nevertheless, the data presented give a general idea of the length of stay of a large and substantial percentage of the total number of Purple Finches that were banded at the Ardmore station during the invasion.

The basis used in this study is somewhat different from the basis used by Raymond J. Middleton in his study of repeats (*Bird Banding*, 10, 1939: 145-148). Mr. Middleton used as a basis for the length of stay, the number of days that elapsed after the bird was first captured until the bird re-entered the traps, while in the present study, the length of stay is based on the number of days the bird remained from the day of banding to the last time it repeated.

TABLE I

COMPARATIVE NUMBERS OF REPEATING BIRDS

Period	*Ad.♂*	*Ad.♀ and Im.*	*No. and % banded each period*	*Ad.♂*	*Ad.♀ and Im.*	*No. and % not remaining of birds banded each period*	*Ad.♂*	*Ad.♀ and Im.*	*No. and % repeating of birds banded each period*
Feb. 10–28	4	31	35 or 3.1%	2	16	18 or 51.4%	2	15	17 or 48.6%
Mar. 1–15	19	42	61 or 5.3%	15	28	43 or 70.5%	4	14	18 or 29.5%
Mar. 16–31	223	259	482 or 42.1%	170	161	331 or 68.7%	53	98	151 or 31.3%
Apr. 1–15	147	233	380 or 33.2%	102	133	235 or 61.8%	45	100	145 or 38.2%
Apr. 16–30	56	107	163 or 14.2%	42	89	131 or 80.4%	14	18	32 or 19.6%
May 1–15	1	24	25 or 2.2%	1	20	21 or 84%	..	4	4 or 16%
	450 or 39.3%	696 or 60.7%	1146	332 or 73.8%	447 or 64.2%	779 or 68%	118 or 26.2%	249 or 35.8%	367 or 32%

The data presented in Table 1 demonstrate that the peak of the invasion was between March 16th and April 30th. Of the 450 adult males banded, nearly half of them were banded in a two-week period between March 16th and March 31st. This table also shows that over two-thirds of the birds banded, or about 68%, passed through the station without repeating, and that about one-third, or 32%, repeated and remained from 1 to 68 days. Only 26% of the banded adult males repeated, while almost 36% of the banded olivaceous birds repeated.

TABLE II

PURPLE FINCHES BANDED—1146

	Repeats
Adult Males	118
Adult Females and Immatures	249
Total	367

KNOWN LENGTH OF STAY OF REPEATS

Period	*1 to 10 days*		*11 to 20 days*		*21 to 30 days*		*31 to 40 days*		*41 to 50 days*		*51 to 68 days*	
Feb. 10 to May 15 1939	Total 170		Total 93		Total 54		Total 33		Total 9		Total 8	
	Ad.♂	*Ad.*♀ *and Im.*	*Ad.*♂	*Ad.*♀ *and Im.*	*Ad.*♂	*Ad.*♀ *and Im.*	*Ad.*♂	*Ad.*♀ *and Im.*	*Ad.*♂	*Ad.*♀ *and Im.*	*Ad.*♂	*Ad.*♀ *and Im.*
Feb. 10–28	1	..	1	3	..	1	..	..	..	3	..	8
Mar. 1–15	1	1	2	3	..	2	1	6	..	2	..	..
Mar. 16–31	18	22	16	28	14	26	4	19	1	3	..	..
Apr. 1–15	36	58	5	32	4	7	..	3	..	..	..	..
Apr. 16–30	14	15	..	3	..	..	..	..	..	..	..	..
May 1–15	..	4	..	..	..	..	..	..	..	..	..	..
	70 or 59.3%	100 or 40.2%	24 or 20.3%	69 or 27.7%	18 or 15.3%	36 or 14.5%	5 or 4.2%	28 or 11.2%	1 or 0.9%	8 or 3.2%	.. or ..	8 or 3.2%

Table 2 shows in detail the known length of stay of repeating birds It will be noted that repeating adult males did not remain longer than 30 days, while olivaceous birds stayed up to 68 days. Comparatively few birds repeated after the 15th of April, only 36, or about 10% of the 367 repeating birds.

It is apparent from the length of stay of these repeats that Purple Finches during the 1939 spring migration, in the region of the Ardmore station, were moving north rapidly to their breeding territory. Sixty-eight percent of the entire 1,146 banded passed through the station without repeating. Adding the 170 birds that repeated and

stayed only from one to ten days, it appears that 82.80% of all the birds banded were gone by the end of ten days. Rosy males moved more rapidly than olivaceous birds—89.33% of the 450 rosy males were gone by the end of ten days, while only 78.59% of the 696 olivaceous birds were gone within ten days after banding.

The Ardmore station is no doubt along one of the routes in the eastern flyway of the Eastern Purple Finch, but judging from the experiences at Ardmore and other stations in southeastern Pennsylvania, there must be several routes in this region. For example, during the southward migration of 1939-40, 498 Purple Finches were banded at the Ardmore station, but only four birds were retaken out of the 1,146 banded the previous spring. Of the 498 Purple Finches banded during the 1939-40 season, only about 10% were rosy adult males, against 450 or nearly 40% the previous spring. This would suggest that the birds follow one route in the spring and another one in the fall.

The routes travelled by the Purple Finches in southeastern Pennsylvania appear to be very narrow ones. After the spring invasion in 1939, I made an inquiry as to the number of Purple Finches banded at seven stations within a radius of twelve miles from the Ardmore station. During the invasion, the seven stations had banded a total of only 457 Purple Finches. Two of these stations, located ten and twelve miles northeast of the Ardmore station, in the direction of the spring migration, banded 390 Purple Finches, while the other five stations located two to ten miles south, east and west of the Ardmore station banded the remaining 67 birds. The fact that the two stations to the northeast of the Ardmore station banded 85% of the total of the seven stations is very significant in considering the width of the Purple Finch spring migration route in this region.

The unusual number of Purple Finches captured during the invasion presented the opportunity to secure wing measurements of a large number of a single species in a short time. The closed wing measurement, or the chord, was taken of each one of the 1,146 Purple Finches banded. The wing was measured with dividers in millimeters, the length was determined from the farthest anterior part of the bend of the wing to the tip of the longest primary, without flattening out the curve of the feather, so when comparison was made with the measurement of skins, it would help to eliminate any possible difference because of shrinkage that may occur in the drying of the skins. The purpose in taking these wing measurements was to find out, if possible, whether or not there was any correlation between the wing length and the sex of olivaceous birds.

The wing measurements were taken of the 450 live adult rosy males banded, a study was made of the wing measurements of a series of 115 Purple Finch skins now in the collection of the Academy

of Natural Sciences of Philadelphia, and these findings are compared with the Purple Finch measurements, taken with dividers, by Robert Ridgway (1901, Birds of North and Middle America, U. S. Nat. Museum Bulletin No. 50, part 1), and the Purple Finch wing measurements of live birds, taken with a ruler by Mrs. Kenneth B. Weatherby (1934, *Bird Banding*, 5 (2), 1934.)

TABLE III

WING MEASUREMENTS OF EASTERN PURPLE FINCH

	Males					*Females*				
Series	*Sex*	*No. of Skins*	*No. of Live Birds*	*Millimeters*	*Average*	*Sex*	*No. of Skins*	*No. of Live Birds*	*Millimeters*	*Average*
Academy of Nat. Sciences	Ad.♂	49	..	81.00–95.00	84.84	♀	39	..	73.50–84.50	80.69
Academy of Nat. Sciences	Im.♂	27	..	79.50–86.00	82.37	..	..	..	....	....
Robert Ridgway	Ad.♂	15	..	80.77–86.36	83.31	Ad.♀	15	..	76.71–82.55	80.26
Mrs. Kenneth B. Weatherby	Ad.♂	..	72	79.25–88.00	83.43	Ad.♀	..	142	76.75–87.00	80.52
Horace Groskin	Ad.♂	..	450	79.00–90.00	83.06	♀ and Im.♂ and ♀	..	696	73.00–86.00	80.28

THE 4 SERIES OF BIRDS MEASURED BY HORACE GROSKIN

Of total birds in each series the greatest number measured as follows:

Series	*Total No. in Series*	*Greatest No. and in Series*	*Measured in Millimeters*	*Average*
Academy of Nat. Sciences	49 Ad.♂ skins	37 or 75.51%	82.50–86.00	84.19
Academy of Nat. Sciences	27 Im.♂ skins	20 or 74.07%	82.00–86.00	83.03
Horace Groskin	450 Ad.♂ live birds	338 or 75.11%	82.00–86.00	83.60
Academy of Nat. Sciences	39 ♀ skins	29 or 74.36%	79.00–83.00	80.83

From the data presented in Table 3, it is evident that in the four series of 586 adult male birds, comprising both live birds and skins, no wing measurement of an adult male is less than 79 millimeters. In the series of 27 olivaceous birds, sexed as males, in the collection of the Academy of Natural Sciences, no wing measurement of these immature males is less than 79 millimeters.

In the series of Ardmore specimens of 450 live adult males, the wings of 338, or 75.1% measured 82-86 millimeters, and in the series of the Academy of Natural Sciences of 49 adult male skins, the wings of 37, or 75.5% measured 82.50-86.00 millimeters, and in the Academy of Natural Sciences' series of 27 immature males, the wings of 20, or 74.1% measured 82-86 millimeters. The greatest number and percentage of male birds in each series had wing measurements that not only exceeded 79 millimeters, but was more than 82 millimeters. Four olivaceous birds banded at Ardmore measuring 84.50, 83.50, 79.00 and 79.00 millimeters respectively, returned as rosy adult male birds.

It is demonstrated that in the three series of 196 female wing measurements of both live birds and skins, all wing measurements are less than 85 millimeters except in Mrs. Weatherby's series which reaches 87 millimeters. However, the averages of the three series show less than one-half millimeter difference and Mrs. Weatherby's average is so close to the others, that it is quite apparent very few of her birds could have measured over 85 millimeters. Therefore, it appears from a comparison of the four series that female wings usually do not measure over 85 millimeters. The study made of the 39 female skins in the collection of the Academy of Natural Sciences as shown in the second portion of Table 3, is particularly conclusive. Of these 39 skins of females, the wings of 29, or 74.4% measured 79-83 millimeters and only five birds in the Academy's female series measured over 83 millimeters, while the longest wing in the series did not measure over 84.50 millimeters. Ridgway's series of adult females did not exceed 82.55 millimeters.

Therefore, it is suggested that olivaceous birds with wings measuring less than 79 millimeters are usually females and olivaceous birds with wings measuring more than 85 millimeters are usually males, while olivaceous birds with wings measuring between 79 and 84 millimeters may be males or females.

Bird banders handling thousands of live birds each year have an unusual opportunity to increase the value of their efforts by taking accurate measurements by some agreed upon uniform method. Banders are in a position to secure large series of measurements of many species, in fact much larger series than the series of skins now found in the museums throughout the world. These measurements taken of live birds would be of great value in helping to determine the differences between species and sub-species, as well as the variations existing within the species, and in some species assist in determining sex where the plumage is similar in the male and female.

As a result of the 1939 spring invasion, there have been some interesting recoveries of foreign bands made at Ardmore, as well as Ardmore birds being recovered at other stations. Twenty-four Purple Finches banded at Ardmore during the invasion were recovered within 60 days from the date of banding. Twenty-one of these birds were retrapped at one or another of the seven stations within a 12 mile radius from Ardmore. The three remaining birds were recovered as follows: One bird, banded at Ardmore, March 25, 1939, was caught by a cat 58 days later, (May 22, 1939) at Clarksville, northern New Hampshire, about 500 miles northeast of the Ardmore station; another, banded at Ardmore March 18, 1939, was recovered 39 days later (April 26, 1939) at Athol, Mass., about 300 miles northeast of Ardmore; and the third, banded at Ardmore March 29, 1939, was recovered 33 days later (May 1, 1939) at Sault Ste. Marie, northern Michigan, about 1,000 miles northwest

of Ardmore. During the same period and almost at the same time that the birds banded at the Ardmore station were being captured at Athol, Mass., and at Sault Ste. Marie, Michigan, I was capturing birds at Ardmore coming from those stations.

At the Ardmore station during the invasion ten Purple Finches were captured with foreign bands, *i.e.* birds banded at other stations. Four of these birds had been banded at stations within a ten mile radius from the Ardmore station and the six remaining birds captured came from four other states—New Jersey, Massachusetts, Maine and Michigan. One of the birds, captured at Ardmore on April 15, 1939, had been banded by H. P. Baily a year and eight months before (August 9, 1937) at Northeast Harbor, Maine, about 600 miles northeast of Ardmore. Another, also banded by H. P. Baily at Northeast Harbor, Maine, August 11, 1935, was captured nearly four years later (March 23, 1939) at Ardmore. (Mr. Baily states this bird was an adult male when banded, so it was at least 5 years old when captured at Ardmore). A bird captured at Ardmore March 26, 1939, had been banded four days before (March 22, 1939) at Boonton, New Jersey, 90 miles north of Ardmore.

A bird captured at Ardmore, April 3, 1939 had been banded 21 days before (March 13, 1939) at Belmont, Mass., about 300 miles northeast of Ardmore.

A bird captured at Ardmore on April 5, 1939, had been banded 30 days before (March 6, 1939) at Athol, Mass., about 300 miles northeast of Ardmore. It is interesting to note that both of the Massachusetts birds were banded in March during the spring migration and in breeding territory, and yet they had migrated at least 300 miles southwest to a non-breeding territory when captured at Ardmore, Pa. It appears that the Athol bird came to Ardmore to invite an Ardmore bird to come to Athol, Mass., which it did three weeks later on April 26.

The last bird on the list of foreign bands was captured at Ardmore, March 10, 1939. It had been banded by M. J. Magee about nine months before (May 22, 1938) at Sault Ste. Marie. Mr. Magee writes me that out of the thousands of Purple Finches he had banded in the last 18 years, this was the first one of his finches ever to be recovered in Pennsylvania, and makes the fourth bird captured in the eastern section of the country—one in Nova Scotia, one in Massachusetts, one in Virginia and now, one in Pennsylvania. I have since learned another one of Mr. Magee's birds has been captured in Massachusetts. The recoveries of these birds in the east and Mr. Magee's capture of my Ardmore bird at Sault Ste. Marie, is an indication of a possible east-west migration of the Eastern Purple Finch.

The number of Purple Finches banded during the autumn and winter of 1939–40, at Ardmore, is by far the largest number ever

banded in any previous corresponding period. During the fall and winter of 1939–40, 498 were banded. During a similar period of 1937–38, fifty-four birds were banded to March 1, and during 1938–39, forty-three birds were banded. Therefore, the unusual number of Purple Finches coming through in the fall and winter migration of 1939–40, suggests the possibility of another invasion in the spring of 1940, or, perhaps, some type of "lag" factor never before recognized in our studies on migratory birds.

Ardmore, Pennsylvania.

SOME PARASITES OF THE EASTERN CROW

(*Corvus brachyrhynchos brachyrhynchos* Brehm)[1]

By B. B. MORGAN and E. F. WALLER

DURING the past two academic years, 1938–39 and 1939–40, we have had the opportunity to examine a total of 112 crows (*Corvus brachyrhynchos brachyrhynchos* Brehm); 64 females and 48 males. Seventeen of these were collected in southern Wisconsin and the remainder from five different counties in Iowa. With the exception of six live birds in the Wisconsin group, all others had been shot and had been dead from 24 to 72 hours by the time the examination was made. The dead crows were usually submitted in groups of twelve to fifteen at a time, all in a single container. This naturally provided an opportunity for an exchange of the ectoparasites. The parasitic fauna of these 112 crows was so heavy and the parasites so widely distributed taxonomically that the survey seems worthy of record.

MATERIALS AND METHODS

Part of these birds were submitted by State Conservation Officers through the U. S. Biological Survey, Iowa Cooperative Unit, Iowa State College, Ames, Iowa. Other crows were submitted by hunters and sportsmen. Many of the birds were shot for bounty.

Methods of procedure were very similar to that outlined by Morgan and Waller (1940). That is, the carcasses were chilled at 40° C. for at least one hour. This benumbed the ectoparasites so they could be readily collected. The lice and mites were preserved in 95 per cent alcohol. Examination of the carcasses was made under a 500 watt daylight lamp. After the ectoparasites had been collected, the skin was incised from the head to the anus along the ventral median line and then laid back on each side. This facilitated

[1]A joint contribution from the University of Wisconsin, Department of Zoölogy and Veterinary Science and Iowa State College, Department of Veterinary Pathology; Project 570 in cooperation with the United States Biological Survey, American Wildlife Institute, and the Iowa Conservation Commission.

the examination of the subcutis and the skeletal musculature. The carcass was then opened and all viscera removed. The esophagus, crop, proventriculus, gizzard, and intestines were examined separately in the order named. The contents of each of these organs were placed in shallow, white enamel, 12″ x 18″ pans and running water was used to separate the ingesta and mucus from the parasites. The nematodes and cestodes were collected in a physiological saline solution to which had been added 10 per cent commercial formalin or in 70 per cent alcohol. A composite sample of the rectal contents of each group of birds was examined for parasitic ova and coccidia. In making this examination, the modification of the routine sugar flotation method as described by Waller (1939) was used. The parasites found are hereinafter recorded. Table I shows the number of crows parasitized and the per cent incidence of each parasite.

TABLE I

NUMBER OF CROWS PARASITIZED AND THE PER CENT INCIDENT OF EACH SPECIES OF PARASITE FOUND IN THIS SURVEY

Name of Parasite	*Common Name*	*Location*	*Number Birds Parasitized*	*Per Cent Incident*
Haemoproteus danilewskii	Bird Malaria	Red Cell	1	.89
Plasmodium relictum	Bird Malaria	Red Cell	1	.89
Leucocytozoon sakharoffi	Bird Malaria	Blood Cell	3	2.7
Trypanosoma avium	Trypanosome	Blood	1	.89
Isospora sp.	Coccidia	Feces	2	1.8
Hymenolepis corvi	Tapeworm	Intestine	44	39.3
H. variabile	Tapeworm	Intestine	1	.89
Capillaria contorta	Capillaria	Crop	2	1.8
Acuaria anthuris	Gizzard Worm	Gizzard	19	16.9
Microtetrameres helix	Stomach Worm	Proventriculus	43	38.3
Diplotriaena tricuspis	Filaria	Body Cavity	6	5.3
Microfilaria	Blood Worm	Blood	1	.89
Collyriclum faba	Fluke	Skin near anus	7	6.2
Acarina	Mite	Feathers	7	6.2
Philopterus corvi *Degeeriella secondaria* *D. rotundata* *Myrsidea interruptata*	Biting Louse	Skin-Feathers	26	23.2

ECTOPARASITES

MALLOPHAGA

Family: PHILOPTERIDAE (Burmeister, 1838)

Genus: PHILOPTERUS (Nitzsch, 1818)

Philopterus corvi (Linnaeus, 1758)

Of the 46 biting lice collected from 112 crows, 20 of them were *Philopterus corvi* (*Docophorus corvi*, Osborn, 1896). This parasite was collected from the breast feathers.

Genus: DEGEERIELLA (Neumann, 1906)

Degeeriella rotundata (Osborn, 1896)

Fourteen of the specimens collected were *Degeeriella rotundata* (*Nirmus ro-*

tundatus Osborn, 1896). The majority of this species was taken from the flight feathers.

Degeeriella secondaria (Osborn, 1896)

Nine specimens of this species were collected from the flight feathers; *Degeeriella secondaria* (*Nirmus secondarius* Osborn, 1896).

Family: MENOPONIDAE (Mojoberg, 1910)
Genus: MYRSIDEA (Waterston, 1910)
Myrsidea interruptata (Osborn, 1896)

Only three specimens of this parasite, *Myrsidea interruptata* (*Menopon interruptus* Osborn, 1896), were found on the breast feathers.

ACARINA
Family: ANALGESIDEA (Nitzsch)

Several small mites were found at the base of the breast feathers of seven crows. They belong to the family Analgesidea and subfamily Pterolichinae, but species determination has not as yet been made.

TREMATODA
Family: COLLYRICLIDAE (Ward, 1917)
Genus: COLLYRICLUM (Kossack, 1911)
Collyriclum faba (Kossack, 1911)

As a rule trematodes are internal parasites, but this monostome fluke has the strange characteristic of forming cysts in the skin of the ventral surface around the anus of various birds. Seven crows from Iowa were infected with the immature form of this parasite. There have been many reports of *C. faba* from various hosts. Beaudette (1940) reported *C. faba* from crows in Michigan, and Riley, according to Beaudette (1940), stated he found the same parasite in Minnesota crows.

ENDOPARASITES

PROTOZOA
Order: COCCIDIA (Leuckart, 1879)
Genus: ISOSPORA (Schneider, 1875)
Isospora species

Fecal examination by the modified sugar flotation method revealed coccidia in two crows from southern Wisconsin. Sporulation proved these forms to be Isospora. Species determination was not attempted. In a search of the literature the only reference to Isospora in crows was made by Boughton (1929, 1938) from crows in Minnesota and New Jersey.

Order: HAEMOSPORIDIA (Danilewsky, 1885)
Genus: HAEMOPROTEUS (Kruse, 1890)
Haemoproteus danilewskii (Kruse, 1890)

A heavy infestation of this parasite was found in one crow from southern Wisconsin. The descriptions fall into the range given by Coatney and West (1938). The entire red blood cell is filled by the parasite. Herman (1938) in the examination of four crows from Cape Cod found two infected with *Haemoproteus* and two negative. Coatney and Jellison (1940) reported *H. danilewskii* from a crow in Montana.

Genus: PLASMODIUM (Marchiafava and Celli, 1885)
Plasmodium relictum (Huff, 1937)

One crow from southern Wisconsin carried a light infestation of this parasite. Coatney and West (1938) found *P. relictum* from a crow in Nebraska.

Genus: LEUCOCYTOZOON (Danilewsky, 1890)
Leucocytozoon sakharoffi (Sambon, 1908)

Three crows from southern Wisconsin were found infected with *L. sakharoffi*. Coatney and West (1938) found this parasite in an immature crow from Nebraska. There is some doubt as to whether our form may be *L. berestneffi* (Sambon, 1908) reported by Coatney and Roudabush (1937) from the magpie (*Pica pica hudsonia*). Coatney and Jellison (1940) listed *L. berestneffi* from a crow in Montana.

Order: PROTOMONADINA (Blochmann)
Genus: TRYPANOSOMA (Gruby, 1843)
Trypanosoma avium (Danilewsky, 1885)

The name *Trypanosoma avium* is a collective term for all Trypanosomes found in birds. Until species differentiation can be worked out, this name must be utilized. One crow from southern Wisconsin harbored this parasite. This crow also had a light infestation of *Plasmodium*. Only two specimens of *T. avium* were found. These specimens contained myonemes, and were 46 and 51μ in length, respectively. The flagellum is rather short with a wide undulating membrane. Coatney and West (1938) reported *T. avium* from a crow in Nebraska, which is quite similar to our form.

CESTODA
Family: HYMENOLEPIDIDAE (Ariola, 1899)
Genus: HYMENOLEPIS (Weinland, 1858)
Hymenolepis (Weinlandia) corvi (Mayhew, 1925)

This tapeworm was found in the anterior portion of the small intestine of 44 crows. It was by far the most common tapeworm found in this survey. Mayhew (1925) first reported *H. corvi* in the crow from Illinois. The location of the three testes, the hooks on the scolex, and the structure of the ovaries assures us that this material is *H. corvi*. The mature specimens varied in length from 40 to 75 mm. The infestation varied from 1 to 15 worms. Williams (1929) found this tapeworm in Nebraska crows.

Hymenolepis (Wardium) variabile (Mayhew, 1925)

A single specimen was removed from the posterior portion of the small intestine of a crow shot in southern Wisconsin. No other tapeworms were present. The parasite measured 24 mm. in length. The scolex is large, with a small rostellum armed with a single row of hooks. The three testes vary in position, but the majority were two posterior and one anterior near the median line. Mayhew (1925) first reported this parasite from a crow taken in Illinois.

Ransom (1909) and Williams (1929) both reported the finding of a tapeworm (*Anomotaenia constricta* Molin, 1858) from Nebraska crows. This parasite was not encountered in this survey. Ward (1901) recorded a table showing various parasites collected from Nebraska birds. The table showed the examination of one crow which harbored tapeworms but species identification was not given. Later, Ward and Whipple (1918) stated that Ransom's identification of the parasite was *A. constricta*.

NEMATODA
Family: TRICHURIDAE (Railliet, 1915)
Genus: CAPILLARIA (Zeder, 1800)
Capillaria contorta (Creplin, 1839)

Two crows were infested with this parasite. For species determination eight female and one male specimens were studied. The characteristics of this parasite agree in all respects to the description given by Cram (1936). The spicule sheath carried recurved spines and a single spicule. Canavan (1931) reported *C. contorta* from the crow, constituting a new host for this parasite. This crow had been in the Philadelphia Zoölogical Garden for eight months.

Family: ACUARIIDAE (Seurat, 1913)
Genus: ACUARIA (Bremser, 1811)
Acuaria anthuris (Rudolphi, 1819)

This gizzard worm was found in 19 crows. Cram (1927) pointed out the complexity of the type species, *A. anthuris*, due to poor description by early workers. However, the descriptions by Cram (1927) summarized the work of Rudolphi, Schneider, v. Linstow, and Mueller. Williams (1929) found a gizzard worm in the crow from Nebraska and subsequently named it a new species, *A. nebraskensis*. Cram (1934) clarified the matter with descriptions from other authors since 1927. She also pointed out that *A. nebraskensis* was a synonym for *A. anthuris*. Beaudette and Hudson (1936) stated that *A. anthuris* was a common parasite of the crow in New Jersey. In the species identification of our material, 17 female and 11 male specimens were studied.

Family: TETRAMERIDAE (Travassos, 1914)
Genus: MICROTETRAMERES (Travassos, 1915)
Microtetrameres helix (Cram, 1927)

This small nematode was found in the proventriculus of 43 crows. Two male and 30 female specimens were studied. Cram's (1927) descriptions were based on specimens from crows obtained in Washington, D. C. This parasite is unique in that sexual dimorphism occurs in the females. This parasite has also been reported from Canada. Gates (1933) reported the finding of *Tetrameres americana* (Cram, 1927) in a crow from New York, but Cram (1936) was dubious of the species determination.

Family: FILARIIDAE (Cobbold, 1864)
Genus: DIPLOTRIAENA (Railliet and Henry, 1909)
Diplotriaena tricuspis (Fedtschenko, 1874)

This rare filariid nematode was found on six occasions from 112 crows. This parasite was usually found in the abdominal cavity. Morgan and Waller (1940) reported this parasite for the first time in North America from a crow and recorded a complete description of the form. Cram, in a personal communication to Beaudette and Hudson (1936), stated that *Diplotriaena tricuspis* was the only filariid worm in crows in this country. Her statements are probably based on records of the Zoölogical Division, U. S. D. A., as the writers have been unable to find mention of this parasite prior to our own report.

MICROFILARIA (Cobbold, 1880)

Microfilaria were found in the blood stream of two crows from southern Wisconsin. There have been other reports of microfilaria in crows both in Europe and North America. Elliot (1903), Beaudette and Hudson (1936), and Boughton et al. (1938) have reported microfilaria from crows in North America. The specimens found in our material averaged 130μ in length and 5μ in width. The anterior end is quite blunt and a sheath was evident. Whether this microfilaria is associated with the adult *D. tricuspis* has not as yet been determined.

Other nematodes reported in North American crows but not found in this survey include *Porrocaecum ensicaudatum* (Zeder, 1800) reported by Canavan (1931) from the stomach, duodenum, and gizzard of crows in the Philadelphia Zoölogical Garden; *Syngamus gracilis* (Chapin, 1925) was reported by Chapin (1925) from the trachea of crows in the Philadelphia Zoölogical Park. There is some discussion whether *S. gracilis* is a synonym of *S. trachea*.

In addition to the aforementioned parasites one crow was found to be affected with tuberculosis and another with visceral gout, both birds being markedly emaciated.

Without wishing to enter into the controversy as to whether the

crow should be protected or eradicated, we would like to record our brief observations on the gizzard contents of these birds. The only animal matter observed consisted of small bones and skins of what appeared to be mice, and also some rabbit fur and flesh. We did not find feathers in a single one of the 112 gizzards. Approximately 90 per cent of the gizzards contained corn. In comparing these observations with those of other investigators it must be kept in mind that these birds were collected between December 1, and the end of the following March.

SUMMARY

1. One hundred and twelve crows (*Corvus brachyrhynchos brachyrhynchos* Brehm) from southern Wisconsin and Iowa were examined for parasites and disease.

2. Ninety-one or 81.2 per cent of the crows were found to be parasitized.

3. Four species of Mallophaga; *Philopterus corvi, Degeeriella rotundata, D. secondaria, Myrsidea interruptata* and one species of Acarina; belonging to the family *Anagesidea,* were noted.

4. Five species of Protozoa; *Trypanosoma avium, Leucocytozoon sakharoffi, Plasmodium relictum, Haemoproteus danilewskii,* and *Isospora* species were identified.

5. The immature form of *Collyriclum faba* was encountered in seven crows.

6. Two species of Cestodes; *Hymenolepis* (*Weinlandia*) *corvi* and *H.* (*Wardium*) *variabile,* were found.

7. Four species of Nematodes; *Capillaria contorta, Acuaria anthuris, Microtetrameres helix, Diplotriaena tricuspis* were recorded and a microfilaria was found in the blood stream.

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BLUEBIRD BANDING AT CHESLEY, ONTARIO

BY HOWARD H. KRUG

AT various times for several years I had attempted to attract Bluebirds (*Sialia s. sialis*) into nesting boxes in and around Chesley, Ontario, but had met with little success. The birds took readily to the boxes, made according to the specifications given in Bulletin No. 609 of the United States Department of Agriculture, especially when placed on fence posts outside the town away from the interference of English Sparrows, but I was somewhat discouraged with the project since the boxes were invariably torn down, shortly after being put up, by parties whose identity I could not learn. I next attempted putting the boxes higher up in trees in an open space or on a dead stub but still where they were partly hidden from below. In these places they remained longer but I had very few Bluebirds attracted to them. T. E. Musselman (*Bird-Banding*, 6, 1935: 117-125) gives the details of his Bluebird banding in the neighborhood of Quincy, Illinois. Encouraged by his splendid results from placing the boxes on fence posts in plain view along country roads, I decided to try out a similar method in Chesley in 1936.

The floor space of the boxes as recommended in the United States Department of Agriculture Bulletin is larger than necessary and I adopted the size used by Mr. Musselman, viz., 3¼″ by 3¼″. This makes the box less conspicuous when placed on the fence post and it is less likely to be broken down by cattle rubbing against it. I obtained the best results in placing the boxes near the tops of the fence posts where the removable lids are not knocked off so easily. While the birds did not seem to object to the boxes made of new lumber, those made of old or darkened boards were much less noticeable and consequently much less subject to human interference.

In 1936 I had 24 boxes included in the project and the results were so encouraging that the following year I increased the number to 52, most of which were again used in 1938 and 1939. Practically all of them were in use each year by either Bluebirds, Tree Swallows, or House Wrens, many being occupied for both the first and second nestings. These boxes were spread along about forty miles of country roads, being placed usually on the posts of wire fences and practically always over one-eighth of a mile away from farm buildings to try to keep away from English Sparrows and cats.

A brief summary of the activities of the Bluebirds in these boxes is given in the accompanying table. By "successful nests" is meant only those nests in which at least one nestling matured to leave the box. The four succeeding lower columns naturally contain data only from these nests. Where the number of boxes during the second nesting period varies somewhat from that in the first period, this

has resulted from having insufficient records of these other boxes to include them in the summary although there was sufficient evidence to show that there were additional successful Bluebird nests in these other boxes.

The desertion of so many nests, both before any eggs were laid and before any nestlings were hatched, was unfortunate but I do not believe this represented a very great loss in Bluebird survival for the years concerned. These desertions were mostly all sufficiently early in the season that the birds would still have time to raise two broods elsewhere.

The difference between the number of eggs in the successful nests and the number of nestlings represents not only the infertile eggs but also the disappearence of occasional eggs due to unknown reasons. It is also interesting to note that in these successful nests the nestlings had only a very low mortality before they ventured out of the boxes. This is even more pronounced during the second than during the first nesting period. The difference may be due to the smaller number of eggs and nestlings per nest during the second period.

While the results in 1936 and 1937 were what might be termed normal, in 1938 we had unseasonable weather which adversely affected the results. About the third week in April a very warm spell started most of the birds nesting one or two weeks earlier than usual. During a cool spell which followed, quite a number of these birds deserted their nests. Then toward the end of May we had several cool wet days again and whole broods of dead nestlings were found in several boxes. The failure of these nests, I feel, was due not so much to exposure as to the inability of the parent birds to obtain a sufficient quantity of food for these almost full-grown nestlings. The adults which deserted their nests so early in the season started nesting again when the weather became more favorable, which resulted in very irregular nesting periods. In 1939 the results were a little disappointing with a smaller number of Bluebird nests and a greater number of desertions in the early stages of nesting than in the previous years. This was likely due to the later nesting season and the resulting greater competition for the nesting boxes between Bluebirds and Tree Swallows. English Sparrows also caused a little more trouble in 1939 whereas House Wrens were less troublesome in filling the boxes with their dummy nests.

One of the most conclusive results of this study shows that there is a distinct scarcity of nesting places for cavity-nesting species in an agricultural community such as the vicinity of Chesley, Ontario. Many of the hollow fence posts formerly used by Bluebirds and Tree Swallows have been replaced by steel posts. Many others have been taken over by Starlings during the past decade since their arrival in this part of the country and as a result the smaller

birds, arriving later in the Spring, find it difficult to locate suitable nesting sites. This was proved by the quick acceptance of these newly-built boxes by both the Bluebirds and the Tree Swallows and their rivalry for the same. In most cases the Bluebirds were in possession of the boxes before the Swallows but, if a pair of the latter were insistent on having a box, they usually were successful in driving the Bluebirds away. Starlings also attempted to use the boxes but the diameter of the hole (1½″) prevented them from entering.

TABLE I

BLUEBIRD NESTING ACTIVITIES

Nesting Period	*1936*		*1937*		*1938*		*1939*	
	1st	*2nd*	*1st*	*2nd*	*1st*	*2nd*	*1st*	*2nd*
	May 1 to June 15	*June 10 to Aug. 6*	*Apr. 25 to June 18*	*June 6 to Aug. 10*	*Apr. 18 to June 25*	*June 10 to Aug. 10*	*May 10 to June 25*	*June 20 to Aug. 5*
Number of boxes	24	24	52	51	52	48	45	42
Occupied by Bluebirds	16	14	46	25	43	25	30	17
Nests deserted before eggs laid	0	1	8	3	4	1	7	2
Nests deserted before any nestlings hatched	0	2	11	7	12	8	8	3
Nests deserted with young nestlings	0	0	3	1	9	1	0	0
Successful nests	16	11	24	14	18	15	15	12
Eggs	77	51	117	53	84	67	73	50
Nestlings	72	39	109	44	75	56	64	43
Nestlings leaving nests	68	37	108	44	69	54	52	41
Juvenile birds banded	53	30	81	14	35	20	46	30
Adult birds banded	4	3	20	2	20	8	11	1

Banding returns to date have been rather disappointing but, with more birds banded each year, hopes are held for better results in the future. Only five returns of Bluebirds banded in previous years have been obtained. Three of these were adult females recovered a year after banding from the same boxes at which they were originally captured. Another adult female, 34-167002, was banded from a nest in a hollow fence post on May 27, 1935, and was recaptured in one of my boxes about one and one quarter miles distant on May 11, 1937. Only one bird banded as a nestling, 34-167042, has been recovered. It was banded on June 3, 1936 and was recaptured from the same box as an adult female on May 9, 1937, and from another box about one-half a mile distant on May 9, 1938. In several instances females, banded during the first nesting period, have been recaptured from the same box during the second nesting period but usually they were found occupying different sites for this period.

Up to the present only one male bird has been found brooding a nest of eggs. In this case the female was sitting on the wire fence near the box and I got quite a surprise to find the male on the nest. At another box I found the female dead on a brood of five nestlings;

the male was near by with a bill full of food. I removed the dead bird and found on my next visit that the young had been raised successfully, probably by the male parent that was left. It appears that the male, while not as active as the female, helps its mate to a considerable extent in raising the young.

During 1938 I found a very persistent female trying to hatch an infertile egg. This bird was captured from a box with one egg on May 28 and on each of three subsequent visits there was still only one egg. Twice, on June 14 and July 14, a female was flushed from the nest and the other time, June 27, the bird was absent but the egg was warm. While I did not capture the bird on any of these later visits, I feel certain from its behavior that it was the same one because it was very timid, flying as soon as I approached the box.

Parasitism from a maggot which is probably Protocalliphora is quite common in the nests of the Bluebirds and Tree Swallows which have been studied, but from the observations during the past four summers, the mortality is almost negligible. It may have been a contributory factor during the unseasonal weather at the end of May, 1938 and during the first nesting period of 1939 when quite a number of dead nestlings were found in nests which were otherwise successful.

Like Mr. Musselman in his experiments, I can say that the farmers on whose fences I nailed the boxes were very agreeable to having them on their properties. I have not yet found anyone who finds fault with the Bluebird and everyone seems to be anxious to have more of them around. Bluebirds are already quite noticeably more common along these roads and the sight of them, along with the boxes, has made many of our rural residents more bird-conscious which has made the experiment not only very interesting but definitely valuable in spite of the comparatively few banding returns.

Chesley, Ontario.

EXPERIMENTAL MODIFICATION OF THE PLUMAGE CYCLE OF THE MALE EUROPEAN STARLING (*Sturnus vulgaris*)[1]

BY J. WENDELL BURGER

WHILE considerable experimental work has been done on the genetic and hormonal factors which determine the character of avian plumage, very little has been published on the factors which determine the seasonal periodicity of plumage changes. Witschi (see Witschi '35 for a summary) in a fine series of studies has shown for some birds, especially the weaver finch, *Pyromelana franciscana*, that cyclic behavior of the pituitary is responsible for the alternation of mating and eclipse plumage. He found moreover, that the time of year when plumage changes occurred in this African weaver finch was the same for birds caged in Iowa City as it was for birds in Africa. For this species at least, conditions of the external environment different from those of the native habitat were without effect on the plumage cycle.

A somewhat different result was secured by Miyazaki ('34, '35) for the "white-eye", *Zosterops palpebrosa japonica*. He induced three sexual maturations in a year by artificially lengthening the days. After each sexual maturation the daily lighting was reduced, whereupon, molting ensued. He found further, that increasing the length of day during the refeathering process caused this refeathering to become irregular and deficient. No relation was found between testicular states as such and the time of molt. Miyazaki's results indicate that the plumage cycle of the "white-eye" can be influenced by changes in the external environment. The purpose of the present investigation was to extend this type of work to the starling.

METHODS AND MATERIALS

Two experiments of similar nature were performed. Twenty-four adult male starlings were given daily, fifteen hours solely of artificial illumination, beginning February 18. The birds were thus put through a precocious sexual cycle. All birds were kept on this light ration until April 19 when sexual regression had reduced the testes to a size approaching that found in sexually inactive birds. On April 19, twelve of the starlings were further kept on fifteen hours of daily light until June 15. The remaining twelve had their daily light reduced to nine hours until May 16 when a fifteen hour daily ration of light was resumed. These latter birds were also maintained until June 15.

Sixteen male starlings who had gone through a natural sexual maturation were given experimental lighting beginning June 24.

[1] Aided by a grant from the Penrose Fund of the American Philosophical Society; this grant administered during 1939–40 by T. H. Bissonnette.

Seven birds were kept on natural day-lengths until June 28, whereafter, their daily light ration was sixteen hours. Nine birds had their daily light reduced to nine hours until July 28, whereafter, their ration was raised to sixteen hours daily. All birds were maintained until September 7.

The undue complication of light changes described was due to the fact that these experiments were designed as well for a problem other than that here discussed.

RESULTS AND DISCUSSION

The starling shows no readily observed sexual dimorphism in its plumage. There is only one molt a year. This occurs in the summer and fall (Kalmbach and Gabrielson '21, Witschi and Miller '38). New feathers on the under surface of the bird are easily observed because of their white tips. Developing feathers can be readily noticed when the birds are handled.

In both these experiments, the birds whose light ration was constantly around 15-16 hours daily, molted. In the spring experiment, the first signs of new feathers were found about May 26. In the summer experiment, these signs were found about July 25. In both experiments, many new feathers were developing at the terminations of these experiments on June 15 and September 7. In fact, the bulk of the refeathering occurred closer to these end dates than to May 26 and July 25. The refeathering involved all the feather types, and certainly, the great majority of the feathers. In two birds, one in each experiment, little signs of molting were found. The testes of all the above starlings were inactive sexually.

The starlings which experienced a reduction to nine hours in their daily light ration molted more early and refeathered more quickly than did the birds which experienced no reduction in their daily lighting. In the spring experiment, the first signs of refeathering were found about May 9, roughly fifteen days earlier than these signs appeared in the birds whose light was not reduced. The refeathering moreover, was completed by May 29. In the summer experiment, the first signs of refeathering were found about July 8, seventeen days earlier than these signs were observed in the birds which received no reduction in their daily lighting. The refeathering was completed by July 28.

This short period of about twenty days, in which a complete refeathering occurred, is in contrast to the 45 days in the summer, when the starlings whose daily lighting was about sixteen hours, failed to complete their refeathering. In one bird in the spring experiment and in two in the summer experiment, only scattered new feathers were ever found.

It should be emphasized that in each experiment the refeathering (of the birds whose light ration was reduced) was completed by the

time refeathering reached its peak in the starlings on long days.

The testicular states involved in these experiments where reduced lighting was used were first, sexual inactivity at the beginning of the experiments, and second, a recrudescence of the testes for *some* of the birds in the last three weeks of the experimental period. Since this sexual maturation occurred only after the refeathering process was practically completed, no data are available as to whether or not the plumage cycle is at all related to the sexual cycle. The only information for the starling is that given by Witschi and Miller ('38) who find injections of sex hormones are without influence on the plumage of Sturnus.

In each experiment, conditions of food and temperature were the same for lots of birds to be compared with each other. While these factors are conceivably important, it is hard to see how they had any influence on the results described.

These experiments indicate that molting in the male starling can occur independently of the changes in length of day. Birds in nature molt when the days are growing shorter. In the laboratory, starlings molted when the days were constantly maintained at a length near that of the longest day of the year at the latitudes of New England. This much agrees with Witschi's findings on the African weaver finch.

A reduction in day-length however, was accompanied by a molt which appeared earlier than that of the starlings kept on long days. This earlier molt was also followed by a more rapid refeathering. It would appear that molting and subsequent refeathering will occur no matter what the day-length, but that a reduction in day-lengths favors or reinforces these processes. This situation is similar to that found by Miyazaki for the "white-eye" and by Bissonnette ('35) for the hair cycle of the ferret. The "white-eye" however, seems to be more influenced by light changes than is the starling. The full interpretation of the relation of the plumage cycle to the external environment requires work more elaborate than that of this preliminary investigation.

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REPORT OF A WHOLESALE DIE-OFF OF YOUNG HERRING GULLS, HOGBACK ISLAND, MOOSEHEAD LAKE, MAINE

BY CLARENCE M. ALDOUS

ON August 18, 1939, Dr. Clifford Nelson, Parasitologist at the University of Maine, and the writer made a trip to Moosehead Lake in Maine to investigate a report of a wholesale die-off of young herring gulls on Hogback Island. Assisted by Warden Ed Lowell, we carefully searched that small island for sick and dead birds. Thirty-six carcasses were found. Some of the bodies were completely disintegrated, while a few showed that the birds had not been dead more than about two days. In no case was it possible to examine any of the bodies because of the bad state of decomposition.

This situation was of particular interest to us because during the month of June in the past four breeding seasons we had banded a total of 462 young herring gulls.

Of the 36 dead juvenile birds found, only 9 had bands on their legs. Some fishermen had previously picked up many of the dead gulls and had removed some of the leg bands. The number of dead birds found probably does not represent all the gulls that died, as no doubt many died while in the water and were washed away.

No sick birds were seen on the island, but when we cruised on the water in the vicinity of the island we noted that several of the young gulls had considerable difficulty in taking off. Five of these weak young gulls were collected for study. Four of these were extremely emaciated. There was very little muscle tissue on the breasts, as the accompanying photograph shows. Two of the five birds collected had been banded in June, 1939. The viscera of the five birds were examined for parasites by Dr. Nelson, and his findings are given in the following table:

PARASITES FOUND IN THE FIVE HERRING GULLS

	Bird No.				
Parasite	*1*	*2*	*3*	*4*	*5*[1]
NEMATODES					
Cosmocephalus obvelatus	...	...	...	...	2
Contracoecum spiculigerum	...	7	...	6	2
Capillaria sp.	...	1	...	1	...
CESTODES					
Diphyllobothrium sp.	...	9	5	...	...
TREMATODES					
Diplostomum sp.	183	112	241	500+	142
Cotylurus communis	24	6	12	15	6
Mesorchis pseudocchinatus	221	88	12	500+	3

[1] Bird No. 5 was in good flesh, as shown by the photograph. As will be noted in the table, this bird had slightly fewer parasites than did the other four birds.

Note emaciated condition of the breast of the bird on the right as compared with the bird on the immediate left.

Of three nestlings found soon after they had died during the banding work in June, 1939, only one was at all parasitized. It had one specimen of *Contracoecum spiculigerum* in the esophagus and one specimen of *Diplostomum* sp. in the intestine. In six adult herring gulls collected in June from the same colony, a number of species of parasites were found that did not occur in the young at Moosehead Lake. These were *Streptocara tridentata*, *Choanataenia ransomi*, *Ornithobilhartzia lari*, *Clinostomum marginatum*, *Strigea bursigera*, *Parorchis avitus*, and *Psilostomum plicitum*. Only a few individuals of each species, however, were present.

In view of the complete absence of parasites in newly hatched young, it is reasonable to assume that the heavy parasitism found in the gulls taken in August—when they were a little more than

two months of age—came from their food, which is made up almost entirely of rough fishes. Dr. Nelson is of the opinion that *Cotylurus communis*, even though present in small numbers in the infested juvenile birds, may have contributed largely to their emaciated condition and general weakness. He quotes from the writings of LaRue[2] on this subject: "When present in numbers *C. communis* causes emaciation which becomes marked by the eighth day to the tenth day after feeding with the infested *Percopsis*. Paralysis of the leg muscles may be noted at about the same time and death usually follows on the twelfth to fifteenth day after feeding. The host may survive less severe infestations for weeks and may eventually recover."

Dr. Nelson also believes that the common sucker found in Moosehead Lake is the host for *C. communis* and no doubt is the chief source of parasitism in the young herring gulls. It is probable, however, that chubs, minnows, sunfishes, and other species of rough fishes, which are present in the waters of Moosehead Lake and which are also eaten by the gulls, may be hosts for some or all of the parasites found in the herring gulls there. This point cannot be settled, however, until collections of these fishes are made and examined for the presence or absence of the parasites. Further studies will be necessary to determine the cause of such extensive losses of birds as herein reported.

Maine Cooperative Wildlife Research Unit, University of Maine, Orono, Maine

[2] 1932. LaRue, George R., Morphology of *Cotylurus communis* Hughes (Trematoda: Strigeidae), Trans. Amer. Mic. Soc. 51:1, 28–42.

GENERAL NOTES

Flicker with Orange-red Shafts in Wing and Tail Feathers.—A juvenile flicker of more than usual interest was banded at the Wharton Station, Groton, Massachusetts, on September 24, 1939, with band 38-360652. The bird was acquiring its first winter plumage, the tail being composed entirely of new feathers, the two central ones, however, being only about one inch out of the sheaths. The wings also were in process of being renewed, both old and new feathers being present. The old feathers in the wings had the normal yellow shafts. The new feathers present, though, were distinctly extraordinary, being described as having orange-red shafts. All the tail feathers had orange-red shafts.

This bird probably just missed being a collector's item. Feathers in the left wing had on them the almost unmistakable markings caused by shot. One shot had apparently also gone completely through a tail feather. Perhaps some collector will remember attempting to bag an atypical specimen of *Colaptes auratus luteus*.—Edwin A. Mason, Wharton Bird Banding Station, Groton, Massachusetts.

Migrant Shrike Returns on Anniversary of Its Banding.—Looking from a window just after noon on January 20, 1940, I saw a Tree Sparrow (*Spizella a. arborea*) enter a Government sparrow trap in my back yard. I got into my wraps and rubbers at once and went out to release it. Certainly less than three minutes elapsed after I left the window until I stepped out of the door into the light snow which covered the ground. Within that short time, however, a Migrant Shrike (*Lanius ludovicianus migrans*), previously unseen, had entered the trap. As I left the house he could be seen trying to escape from the trap with the dead sparrow dangling from his beak. The shrike's beak held the sparrow by the nape of its neck.

When I approached very close to the trap the shrike dropped its prey in one corner. The sparrow's body did not even quiver, its life had been so completely erased during those few seconds. Although the shrike remained in the trap for almost an hour while I observed him from a distance, not once again did he pay the least attention to the dead sparrow, much less touch it.

The shrike, by the way, wore a band on its right leg. Upon examination I found it to be 39-214051, which I had placed upon the leg of a Migrant Shrike exactly one year previous (January 20, 1939). Upon that occasion the bird was captured in a crab net while it was attempting to reach two Tree Sparrows in the same Government sparrow trap. (See *Bird-Banding*, April, 1939, page 90.)—G. Hapgood Parks, 99 Warrenton Avenue, Hartford, Connecticut.

Robins and Cowbird Eggs.—Herbert Friedmann was fortunate enough to see a Cowbird (*Molothrus ater*) lay in a Robin's (*Turdus migratorius*) nest and describes the manner in which the owner promptly ejected the egg (The Cowbirds, 1929: 259). He found, however, that a Chipping Sparrow egg (*Spizella passerina*) of similar color as the Robin's eggs, but much smaller, was tolerated.

I have experimented with four Cowbird eggs and three English Sparrow (*Passer domesticus*) eggs; two were rejected and five accepted. One female Robin in Columbus, Ohio, and another in Augusta, Michigan, each removed the Cowbird egg at once. Two English Sparrow eggs hatched one day after one young Robin; a few hours later the whole brood had been taken by some enemy. The third English Sparrow egg hatched five days before the Robin eggs; the nestling lived only one day. One Cowbird egg failed to hatch, apparently having been addled before it was given to the Robins. The other hatched on the same day as two of its nest-mates, the third Robin hatching the following day. Although dwarfed by its companions, the Cowbird survived for three days.

Friedmann mentions "Half a dozen or more records," from five states of Cowbird eggs in Robin nests. Trautman (*Birds of Buckeye Lake*, 1940: 393) reports one similar case and also three instances in which Robins were feeding Cowbirds out of the nest; this is not proof that the latter were raised by the former, as young

Cowbirds sometimes attach themselves to other foster parents. The only case I can find of Robins raising Cowbirds was that of Friedmann's where he "put two very young Cowbirds in a Robin's nest which contained only eggs at the time. The Robins stopped incubating their own eggs and took care of and reared the young Cowbirds."

Here is an interesting field for experiment. Instead of destroying that next Cowbird egg, put it in a Robin's nest, or give it to an English Sparrow, House Wren or Starling, and watch what happens.

We often read of "the same pair of Robins" returning year after year to the same nest under the porch, but the identity of the birds is usually taken for granted. In 1929 a pair of color-banded Robins raised three broods between March 27 and July 12 on our neighbors' porch in Columbus, the first in a nest built by the female on the southwest corner, the others in a nest she built in the northeast corner. Neither of these birds was seen after that year. In 1930 an *unbanded pair* adopted the nest in the southwest corner.—MARGARET M. NICE, 5708 Kenwood Avenue, Chicago, Illinois.

NOTES ON TECHNIQUE

Two basic bait mixtures are used at the Wharton Bird Banding Station. One is aimed at the seed-eating small bird group, mostly Fringillidae; the other at larger species, mainly *Icteridae*. Two separate trap models with two and four-inch entrances respectively, are used in conjunction with these mixtures. Thus by correlating the sizes of entrances and baits offered the two groups, it is possible to reduce to a minimum the association in the traps of larger birds with smaller ones, and the consequent possibility of injury to the small birds.

Millet, canary seed, hemp, sunflower. These in a 4-2-1-1 ratio by bulk make a mixture with a wide appeal to the whole finch family. It also attracts members of Paridae and others. Golden millet (German) is the millet generally used, but if an unfavorable price differential exists between this and other varieties, a proportion of the millet in the mixture can be other than golden. Japanese, and both large yellow and red millets (the last two are both Proso millets), have been used, but it was rather definitely proven that the red is less readily taken than the others. Because of its tendency to spoil, chick feed is not added to the mixture as it used to be. The naturally polished surface of the seeds give good protection against spoiling by mildews and moisture. They will sprout, of course.

A grain mixture of cracked corn, unhulled rice, oats, and Japanese buckwheat, roughly in ratio by volume of 5-2-1-1, has been found excellent for Red-winged Blackbirds and Bronzed Grackles. The oats in the mixture probably aided this bait to attract male Bobolinks prior to the nesting season. Twenty were trapped in 1939. In 1940 eight and one female were banded and a return from the previous year trapped. The buckwheat has aided in attracting a few mourning doves into the traps. This species is also fond of hemp.

Oats soaked in water for a few days were very efficient during winter months as a bait for White-throated Sparrows and Meadow Larks in South Carolina. For unknown reasons this bait has not been found satisfactory in Massachusetts.

By relying upon the two mixtures referred to above, plus the use of water, a large number of species can be trapped. Seventy-three were trapped at the Wharton Station in 1939. Such baits have the advantage of being unattractive to cats and dogs. When it is found desirable to resort to bread and cracker crumbs, meat scraps, nuts, and suet, it is good policy to raise the traps well off the ground by means of a table, bench, or other similar support.—EDWIN A. MASON, Wharton Bird Banding Station, Groton, Massachusetts.

RECENT LITERATURE

Reviews by Margaret M. Nice

BANDING

1. Returns of the Chaffinch to a Reef Island. (Ueber die Ortstreue der Buchfinken (*Fringilla c. coelebs* L.) auf einem Schäreninselchen.) Goren Bergman. 1939. *Ornis Fennica*, 16: 95–98. On a forested island 6 hectares in size 15 kilometers from Helsingfors 14 adult Chaffinches were banded, 9 males and 5 females (2 in 1933, the rest in 1934). Two females were present 1 year, one 2 years, one 3 years and one 5 years. Two males were present 1 year, three 2 years, two 3 years, one 6 years and one 7 years—a remarkable record. The return percentage of these breeding birds from 1935 to 1939 was: 64, 43, 21, 21, 7. Two of the birds were recovered in Belgium. One pair nested together for two seasons. One of 18 young returned to its birthplace and nested. The average age of the breeding birds came to at least 2.8 years.

2. Winter Banding of Oklahoma Crows. E. R. Kalmbach and S. E. Aldous. 1940. *Wilson Bulletin*, 52: 198–206. Of 714 *Corvus brachyrhynchos* banded in central Oklahoma during the winter of 1935–36, 143 were recovered—20 per cent. None bred in Oklahoma; recoveries in summer came from the Prairie Provinces. Crows were found to remain in much the same locality in the winter, and to return there the following winter.

Nos. 25 and 59 are also concerned with banding.

MIGRATION

3. The Spring Migration of the Wood-Warbler over Europe. H. N. Southern. 1940. *British Birds*, 34 : 74–79. *Phylloscopus sibilatrix* starts about 2 weeks after the Willow Warbler (*Ph. trochilus*), but makes up most of the leeway by May 1st. A map is given showing the progress of the species every fortnight with the isotherm of 48° for comparison.

4. Migration and Winterquarters of the Red-breated Flycatcher. (Zug und Winterquartier des Zwergfliegenschnäppers (*Muscicapa parva parva* Bechst.)). H. Grote. 1940. *Journ. f. Ornithologie*, 88 : 355–372. This species breeds in northeastern Europe and winters in India.

LIFE HISTORY

5. Further Notes on the Breeding of the Little Blue Penguin. E. W. Hursthouse. 1940. *Emu*, 40 : 121–123. A pair of *Eudyptula minor* in New Zealand incubated for 38 days, the longest period of sitting by one bird being 6 days. The young showed the first sign of molting down at 38 days and left the nest at 90 days.

6. Observations on the Black-footed Albatross. Loye Miller. 1940. *Condor*, 32 : 229–238. *Diomedea nigripes* exhibits a strong social impulse. "Individuals swim close together, frequently rubbing beaks or 'caressing' each other about the head."

7. Some Notes on the Bittern. G. K. Yeates. 1940. *British Birds*, 34 : 98–99. An incubating female *Botaurus s. stellaris* was visited by a male, whereupon there ensued a "battle royal", then coition. "Simultaneously the male fed the hen." The author suggests the male may have been an unmated bird.

8. Production of the Redhead (*Nyroca americana*) in Iowa. J. B. Low. 1940. *Wilson Bulletin*, 52 : 153–164. A study of the nesting ecology of this duck with the fate of 42 nests tabulated according to the nesting cover. Of these 23 were successful, while 38 per cent of the eggs produced young. Flooding was responsible for the greatest loss; Crows accounted for only one nest. An average of 3.8 juveniles were reared to a breeding pair.

9. The Biology of the European Golden-eye. (Beitrag zur Biologie der Schellente (*Bucephala clangula*)). Paul Bernhardt. 1940. *Journ. f. Ornithologie*, 88 : 488–497. *Glaucionetta clangula* breeds near Dresden. Photographs of courtship displays are given. The male guards his mate while she is laying; he attacks only other Golden-eye males. A male, raised in a zoo with Mallards and Pochards courted a Mallard hen, attacking her rightful mate by diving underneath him—a technique that completely baffled the Mallard. The young are cared for by their mother for only two to three weeks; as diving ducks they are much more independent than river ducks, since they escape dangers by diving.

10. From Egg to Eaglehood. Lewis and Marian Walker. 1939. *Natural History*, 43 : 284–289, 307. In San Diego County, California, a pair of Golden Eagles (*Aquila chrysaëtos*) has nested in a sycamore from 1918–1938, but despite the protection afforded by the rancher, only once have eaglets been raised. Two eggs were laid in January; incubation lasted 43 days. The male did most of the hunting, coming about seven in the morning with a ground squirrel or rabbit, and leaving immediately; about noon he would take his place on the nest, staying until about four in the afternoon. Turkey Vultures came towards the nest when on the lee side, but veered off when they saw the baby Eagle; they evidently had been attracted by the smell of the over-abundant food supply.

11. Co-operative Quail Study Association. Eighth Annual Report. H. L. Stoddard. 1940. Thomasville, Ga. 27pp. Excessive rain may be disastrous to young *Colinus virginianus*, but "drought is much more to be feared than excessive rainfall in country of rolling topography. Quail eggs require an abundance of moisture for hatching, and may spoil in large numbers during extended periods of abnormally dry and hot weather." "Owners of quail ground should keep on the safe side by leaving a breeding stock sufficiently heavy to insure quick recovery in the event of one or more disastrous breeding seasons." On tracts of 1000 acres or more in the eastern United States Bobwhites seldom reach an abundance of one bird an acre; possible explanations are discussed. Cotton rats are expected to reach their peak next year. "Large numbers of Marsh Hawks normally appear at the 'peak' of the cotton rat cycle to feed on these rodents."

12. Quail and Pheasant Studies in an Orchard County. Frank C. Bellrose, Jr. 1940. *Natural History Survey. Biological Notes*, 13 : 1–11. Urbana, Ill. In Calhoun County in southern Illinois in 1938 orchards were found to be the safest nesting sites. A high mortality of Quail nests resulted from mowing, only 17 of 65 nests (20%) hatching. Alfalfa was the most dangerous location. Suggestions are made as to postponing mowing after July 4 wherever possible and leaving uncut areas along the margins of orchards.

13. Mating Performance of the Sage Grouse. James R. Simon. 1940. *Auk*, 57 : 467–471. A group of some 300 cock *Centrocercus urophasianus* were watched from a car on their display grounds. Each cock stood 25–40 feet from his neighbor; sometimes they fought, mostly with wing-beating. Pictures are given showing stages of the remarkable display. "Coition seemed to occur only on invitation from the female." One "cock was seen to mate with three different hens." Occasionally a cock covering a hen was attacked by other cocks.

14. Notes on the Breeding Habits of the Mallee-Fowl. F. Lewis. 1940.

Emu, 40 : 97–110. Very interesting account of the remarkable nesting habits of the Lowan (*Leipoa ocellata*) in Victoria, Australia. "The preparation and care of the mound is a whole year job for the Lowan." "Vegetable matter is incorporated in the mound, and being wet when buried, the heat resulting from its fermentation quickly raises the temperature of the mound to the necessary degree" —about 92°F. The pair ordinarily open the mound about 10 A.M. and close it about 3–4 P.M., thus conserving solar heat. "When unsuitable weather conditions such as cold, rain, wind or extreme heat, are likely to be experienced, the mound is not opened but built up, sometimes very high, and even thatched with heavy branches." About 20 eggs are laid. The incubation period lasted 7 or 8 weeks, but in a mound covered with fine wire so that the parents could not work on it, the eggs took 11 and 13 weeks to hatch. "After hatching the young chick takes about two hours to reach the surface of the mound and is not assisted in any way by the parents." It is curious to learn of the care lavished on the mound and the indifference of the parents to the goal of their labors—the chicks. The mound would not seem to be a "labor-saving device."

15. Notes on Nesting and Other Habits of the Western White-winged Dove in Arizona. Johnson A. Neff. 1940. *Journ. Wildlife Management*, 4: 279–290. *Melopelia asiatica mearnsi* was abundant near Phoenix in 1937, less so in 1938 and rare in 1939. It nests in colonies and individually. A nest-viewing apparatus was made from a pole cut into three 4-foot sections with a mirror on top. Each nest was marked with a waterproof tag and a bright orange streamer tied to the tree. Where conditions are favorable second broods are raised. The young usually leave at 16–18 days of age.

Despite the author's extensive experience with this species, I believe he is wrong on two points. He says "eggs may be laid on successive days," p. 286. The rule with pigeons that lay two eggs is that the first is laid in the afternoon of one day, the second in the morning of the second day after. It is astonishing to read that the male is believed not to incubate! So far as I know all male pigeons incubate from mid-morning to mid-afternoon. How otherwise could they work out their nesting economy? The female needs to eat and the feeding grounds were five miles distant from the nesting colony; were the eggs left uncovered while she foraged?

Twice immature White-winged Doves were seen with flocks of Mourning Doves (*Zenaidura macroura*); the young birds made no attempt "to pick a kernel of food, but all ran from one to another mourning dove begging."

16. The Wood Pigeon. W. B. Alexander. 1940. *Journ. Royal Agricultural Society*, 100, Part III : 1–9. *Columba palumbus* breeds throughout the British Isles wherever there are woods or plantations; the birds gather into large flocks and do "serious damage to root and green crops." There has been a great increase in the numbers of these birds in the first half of the 19th century coincident with mass plantations of conifers, and also with the destruction of birds of prey by game keepers. The chief enemies of the Wood Pigeon are the Peregrine Falcon (*Falco peregrinus*) and the Sparrow Hawk (*Accipiter nisus*). As control methods, it is suggested that predators on forest areas should be encouraged to keep down th rodents and incidentally the Wood Pigeons. Two rather shocking methods are suggested: shooting on the nest and dissemination of Wood Pigeon diphtheria. Shooting seems half-hearted; the price obtained for the birds does not pay for the cartridges; sometimes "birds killed in shoots cannot even be given away but have to be buried!" In America we have the problem of over-shooting of our doves and in the recent past we exterminated the finest of our pigeons for the market. It seems curious that the large Wood Pigeon cannot be controlled simply by hunting for sport and utilization as food.

17. The Daily Rhythm of the Swift. (Ueber den Tagesrhythmus des Mauerseglers, (*Apus a. apus* (L.).) Lars von Hartman. 1940. *Ornis Fennica*,

17 : 7–11. Twenty-five pairs of Swifts nested in a tower next which the author slept. The birds were most active between 2–3 A.M. and 6–10 P.M. Rising and retiring is correlated with light as shown by a chart where the birds' activities closely follow the times of rising and setting of the sun. The Swifts are almost night birds since they stay awake until midnight or later. "Going to roost is apparently psychologically conditioned, since the Swifts disappear with explosion-like speed."

18. A Nest of the Arctic Three-toed Woodpecker. E. G. England. 1940. *Condor*, 42 : 242–245. Notes on a nest of *Picoides arcticus* in Sierra County, California. The young kept up a buzzing except when a Red-breasted Sapsucker "flew past the nest tree just as one of the parents sounded a harsh, clicking alarm call some distance away." Both parents fed about equally, usually 3 or 4 visits by one parent, then 3 or 4 by the other. "On leaving the nest both birds frequently flew to the dead top of a tall lodgepole pine about a hundred yards away and drummed loudly. The female's drumming was noticeably softer and slower than the male's." Excellent pictures are given of each parent at the nest.

19. Numerical Data on African Birds' Behaviour at the Nest. II. *Psalidoprocne holomelaena massaica* Neum., the Rough-wing Bank-Martin. R. E. Moreau. 1940. *Ibis*, 14th Ser., 4 : 234–248. A valuable paper. This Bank-Martin is a small bird, weighing only 10 grams; the sexes are alike. The nest is a pad of lichen on a ledge or in a tunnel that is not excavated by the bird. Eight nests were watched by Africans for 800 hours on 125 days. The percentage of time spent in incubation ranged from 31 to 58; periods on and off the nest were much longer than with *Hirundo smithii* (see *Bird-Banding*, Apr., 1940), usually ranging between 8 and 20 minutes. "There is no proof that both members of a pair share brooding or feeding duty. The incubation period is 19 days, the fledging 24–27." "For the first week after hatching the young are brooded as much as the eggs, but after that date the amount of brooding they get varies widely from nest to nest. During the last half of the fledging period the normal brood of two young receives 12 to 20 visits, presumably with food, per 200 minutes (only one-fifth as many as a brood of two *Hirundo smithii*). A solitary *Psalidoprocne* nestling got 80 per cent. as much attention as a pair." The young "fly in the absence of their parents, and efficiently from the first moment." One young flew "continuously for at least six minutes."

Two problems are raised by this study. The first is the part played by the parents in the care of the young; once it is stated that "the old birds visited the nest," p. 246. The other is the young bird's "apparent independence of the parents" when it leaves the nest. The young leave in the absence of the parents, go off through the forest and "the members of a brood did not even try and keep touch with each other. Under such conditions it could not be easy for the parents to find them again, especially as the call of *Psalidoprocne* is extremely feeble." p. 247. Yet all other Swallows with whose family life we are familiar care for their young for an appreciable period after the latter leave the nest.

20. House-Martins Rebuilding Broken Nest and Feeding Young. B. B. Riviere. 1940. *British Birds*, 34 : 87–88. Half of a nest of *Delichon u. urbica* containing feathered young was washed away; the adults built up the nest again completely, "bringing mud and insects to the nest more or less alternately."

21. Scrub Jay Reminiscenses. S. A. Grimes. 1940. *Bird-Lore*, 42 : 431–436. Three adult *Aphelocoma caerulescens* were seen caring for young at one nest. This interesting species—the Florida Jay—is being driven out by the clearing of land and the destruction of its habitat to make room for more beach houses.

22. Note on the Western Spinebill. S. R. White. 1940. *Emu*, 40 : 169–170. *Acanthorhynchos superciliosus* is markedly territorial, as observed in King's Park, Perth. The male is the bolder of the two parents in feeding the young.

23. Some Observations on the Nesting of Hemipus picatus leggei, the Ceylon Black-backed Pied Shrike. W. W. A. Phillips. 1940. *Ibis*, 14th ser., 4 : 450–454. Very small nests are built of lichens in inaccessible positions on bare boughs. The incubating female was rather conspicuous, but the nest was so small that "it was not immediately evident that she was on her nest." The male helps incubate. The fledglings are mottled drab-grey and sit facing one another with their beaks pointing upwards. They did not make "the slightest movement until their parents returned and were actually ready to place food in their mouths." The "coloration and the curious attitude adopted by the young has the effect of producing, while they are on the nest, a truly wonderful example of natural camouflage."

NESTING STATISTICS

24. Populating a New Territory. (Besiedlung eines neues Gebietes.) J. Bussmann. 1940. *Ornithologische Beobachter*, 37 : 69–74. The author moved into a house on the outskirts of Hitzkirch, Switzerland, started a feeding shelf and put up nesting boxes. Nine species used the boxes. By means of the terragraph (see the author's article in *Bird-Banding*, Jan., 1933) records of 13 complete days of feeding were obtained for the Great Tit (*Parus major*) and 12 for the Common Redstart (*Phoenicurus phoenicurus*). The number of meals brought to the 9 young Titmice from the 3rd to 15th day were: 350, 272, 400, 586, 686, 530, 740, 641, 793, 694, 723, 728, 600—a total of 7,743. The young left three days later. There was a steady increase in the number of feedings for the first seven days, then a level reached at about that of the 6th day (really 9th day of nestling life). Often two or more caterpillars were brought at a time. The five young of the Redstarts received the following number of meals from the 5th through the 16th day at which date they left: 172, 232, 240, 220, 374, 334, 340, 360, 357, 365, 246, 236—a total of 3,467 meals in 12 days. The rate increased until the last two days when it dropped down to the level shown at the 7th day of nestling life.

25. The 1939 Nesting Season of Bluebirds at Nashville, Tennessee. Amelia R. Laskey. 1940. *Wilson Bulletin*, 52 : 183–190. The nesting season of *Sialia s. sialis* begins in February and lasts into September; there are three rather distinct nesting periods; the early nests are the most successful. Incubation lasts 13–14 days, fledging usually 16 days. In 1938 February and March were mild, in 1939 cold. In the former year nesting started in February, in the latter in March. One banded female started building on February 23 in 1938, and laid the first eggs of three sets on March 21, April 28, and June 9. The next year she started building March 21, and laid her first eggs on April 15, June 5 and July 29. Tables are given showing that in 1938 the size of the average set was 4.4. eggs, the average number of young fledged per nest was 2.54, and the percentage of success of 460 eggs laid was 57.6. In 1939 the size of the average set was 4.3, the average number of young fledged was 2.18, and the percentage of success of 576 eggs was 50.3. These percentages are lower than those of Musselman in Illinois: 78, 67 and 67; and Low's on Cape Cod: 86 and 65. There was considerable interference from cats, House Sparrows and people. Fifteen females and several males banded as nestlings returned to nest in the vicinity.

LAYING AND INCUBATION

26. On Re-laying and Continuing to Lay. (Ueber Nachlegen und Weiterlegen.) H. Laven. 1940. *Ornithologische Monatsberichte*, 48 : 131–136. A review of the literature. The period of starting to lay again after losing a set of eggs is fixed in some birds (5 days with the Song Sparrow), but with others the period is shorter near the beginning of the destroyed set than towards the end. A table is given of published instances of attempts to induce birds to continue to lay by removing all eggs but one (usually); the classic instance of the Flicker

holds the record with 71 eggs, but is closely followed by a Wryneck with 62 eggs. The European Dipper laid 28 eggs, a Magpie 21, a Jackdaw 18 and a Green Woodpecker 17. Experiments on other species have given conflicting results or no evidence of further laying. More experiments are needed.

27. Birds Brooding on Empty Nests. J. H. Owen. 1940. *British Birds*, 34 : 105–106. Instances are given of brooding before laying in the Peregrine Falcon, Kestrel, Buzzard (*Buteo buteo*) and Owls. Other birds have brooded on nests in which no eggs were laid: Rook, Hedge-Sparrow, Long-tailed Tit and Green Woodpecker. A Great Tit, robbed of her eggs by boys on May 24–25, continued to occupy the nest until June 10.

28. Factors Effecting Length of Incubation. S. C. Kendeigh. 1940. *Auk*, 57 : 499–513. A physiological study of rate of oxygen absorption, gaseous exchange, rate of moisture and weight losses of eggs, etc.

BIRD BEHAVIOR

29. Some Aspects of Central American Bird-Life. I. Family Life in a Non-migratory Bird Population. A. F. Skutch. 1940. *Scientific Monthly*, (Nov.) : 409–418. In Central America a great many birds live in pairs throughout the year; some, however, usually go in flocks, while Hummingbirds, Manakins, certain Cotingas and "forest-haunting flycatchers fail to pair." In the Oropendolas, Caciques and Great-tailed Grackles females outnumber males; they build nests in crowded, populous colonies, the males keeping watch and sounding the alarm at threat of danger. There is little quarrelling between either males or females. "Where birds have the entire year in which to adjust conflicting territorial claims, to settle amorous disputes, they may gradually come to an understanding without resort to violence." The author suggests that hummingbirds, instead of being the "most pugnacious" of our birds may be the "most playful." "Mildness of temper, then seems to be a characteristic of the Central American birds, as a result—so I interpret it—of their leisurely, unhurried manner of life."

30. Pair-Formation in Birds. David Lack. 1940. *Condor*, 42 : 269–286. An important paper with an extended bibliography. "In some species of birds, the sexes meet solely for copulation, in some they form a very temporary pair-bond, in most they pair for the brood or the breeding season, in some they pair for life." In many species the isolation of male (occasionally of female) assists in pair-formation, but in many species "pair-formation occurs in the flocks." "Throughout some families of birds the type of pair-formation is similar, but considerable variation is found within the Icteridae, Paradiseidae and some other groups. [Ploceidae for instance.] Some individual *Podiceps cristatus* and *Haematopus ostralegus* form pairs when in the flocks, others through isolated territories." A distinction is made between social and sexual dominance; this certainly should be done; nevertheless the male Song Sparrow is not merely sexually dominant and the female socially dominant—each is socially dominant in certain situations. The same is true with relatives or friends of the same sex among people; one dominates in some situations, the other in others. Mr. Lack writes, "To conclude, I would not deny the importance of sexual dominance, but it needs clearer definition, and it is not nearly so widespread in birds as Allen (1934) implies. I cannot say more since I have not studied at first hand any species in which it occurs."

"One should not speak of 'sex-recognition', but of the external situations leading to pair-formation, copulation, etc., situations which are often different for different phases of sexual behavior." Tinbergen's "First and later reactions" are discussed, and the need for much more study stressed. As to copulation in contrast to pair-formation, "The external situation provided by the female leading up to copulation is different again, and the releasers are evidently much simpler

than those involved in pair-formation. The major stimulus in most species is simply that the female keeps still." The matter of sexual selection is also discussed. A paper that merits careful study.

31. The Inner Territory of the Black-headed Gull. E. A. Kirkman. 1940. *British Birds*, 34 : 100–104. The "inner" or nest territory of *Larus ridibundus* was the subject of investigation. Nests were never placed by the birds nearer than 18 inches to each other (from center to center); when moved nearer by the experimenter "The same bird that in one experiment played the part of the territory owner, full of assurance and pugnacity, became in the next, as intruder, all hesitation and timidity." In the gulls "territory follows the nest-egg situation." The bird whose nest had been moved near that of another rolled one or two eggs outside and sat on them. In another test two nests, four feet apart were moved next each other. There was "reluctance on the part of the bird *off* the nest to face the bird *on*. The latter, although it had ceased to feel itself a bird in its territory, nevertheless retained that meaning for the former. . . . As soon as the bird *off* overcame its hesitation to get *on*, the other went *off*. Both were regressive."

32. Social Nesting Habits of Guira guira. David E. Davis. 1940. *Auk*, 57 : 472–484. The scarcity of trees in Argentina encourages the flock habit. This species lives in pairs within the flock; there is a flock territory that may be more than a mile in diameter, and sometimes within this a nest territory of one pair. There is "typical but brief chasing" of intruders. In one territory there were two nests, one owned by a pair, the other by 5 birds. The birds huddle together for protection from the cold; mutual preening occurs. Eight distinct calls are listed, "all possessing social significance." The birds are "indolent" in their care of eggs and young, often dropping eggs on the ground. At a nest with 6 young 2 days old, food was brought 6 times in an hour; at another with 4 young 3 days old only 4 times in 5 hours! Juveniles remain with the flock for months.

33. A Behavior Study of the White-tailed Kite. John G. Watson. 1940. *Condor*, 42 : 295–304. Detailed observations on two adjacent pairs of *Elanus leucurus* in the San Joaquin delta, California, weekly visits being made from February 4 to March 31. Territorial fights involving both sexes and courtship display flights of the males were seen. "Work on the nest is done by both members of the pair, but the female alone incubates." [With the Mississippi Kite (*Ictinia misisppiensis*) both sexes incubate (Sutton, *Condor*, 41 : 48) and this is true with some of the European Kites.] "White-tailed Kites are strictly territorial, the main function of the region controlled being to provide the required food supply which consists of small mammals. During the courtship and incubation periods the female does not hunt; the male supplies the food for both. The female concerns herself only with those functions directly connected with reproduction, although if necessary she will aid in territorial defense." It is strange the author does not refer to the papers by Pickwell (*Condor*, 32 : 221–239) and Hawbecker (*Condor*, 42 : 106–111).

34. Additional Notes on the Roosting Habits of the Tree Creeper. M. N. and D. H. Rankin. 1940. *British Birds*, 34 : 56–60. *Certhia familiaris brittanica* roosts in holes in the bark of Sequoias. Times of roosting and of leaving are given, but no data on cloudiness, etc. A stuffed Creeper placed in or near the hole was violently attacked [roosting territory!], but a Stuffed Wren (*Troglodytes t. troglodytes*) was avoided, the Creeper roosting elsewhere. Wrens and Coal-Tits (*Parus ater hibernicus*) deepen the natural holes and then use them for roosting.

35. Threat and "Injury-Feigning" Display of Lapwing. D. Nethersole-Thompson. 1940. *British Birds*, 34 : 138–139. A male *Vanellus v. vanellus*, incubating "chipping" eggs, was watched through field glasses as a sheep and

lamb approached his nest. "The Lapwing rose and, with wings fully raised and shaken, he ran right up to the sheep. All the time he called persistently a shrill *peet-peet-peet*, normally associated with sexual excitement. In this display, as in the 'injury-feigning' performance, the white underwing surface with its dark edges contrasts vividly with the darker plumage." As the sheep took no notice the bird rose and several times struck the lamb. "This also failed to move the sheep, and the Lapwing next squatted and employed the 'injury-feigning' antics" —"one wing was outstretched and shaken as if broken while the other was alternately raised, shaken and lowered." "One thus had the remarkable experience of seeing three different methods of nest-defence—threat, deflection and attack directed by the same bird within the space of a few minutes." The "threat-display" sometimes "precedes leapfrog fights between males," and once was "directed at me by a bird with young which I surprised while cycling." The "injury-feigning" display several times led astray the author's spaniel.

36. "Anting" by the Song Sparrow. M. M. Nice and J. ter Pelkwyk. 1940. *Auk*, 57 : 520–522. Description of this behavior in *Melospiza melodia* with sketches of attitudes assumed.

37. On "Drawing Water" by Some Titmice. (Ueber das "Putten" einiger Meisen-Arten.) Wolf-Rainer Herter. 1940. *Ornithologische Monatsberichte*, 48 : 105–109. Attempts were made to teach Titmice trapped for banding, to draw up a pail containing a mealworm; photographs are given of the Blue Tit (*Parus caeruleus*) pulling it up from a distance of 64 cm. A Great Tit (*P. major*) was partially successful, but did not use its foot to hold the string; a Nuthatch (*Sitta europea*) failed entirely.

38. Studies on Nest-building. (Nestbaustudien.) H. Laven. 1940. *Ornithologische Monatsberichte*, 48 : 128–131. A review of the subject; little has been done except by Francis Herrick.

EFFECT OF LIGHT

39. Spring Development of the Gonads of the Starling (Sturnus v. vulgaris L.) W. S. Bullough and R. Carrick. 1939. *Nature*, 144 : 33–35. Three males collected in a quiet residential spot in Leeds March 7–14 were found to have enlarged testes; of 31 birds taken from a roost of 10,000 Starlings in the country March 7–14, only one was sexually developed. The authors believe that the majority of the country birds were from the Continent (9,000 of them suddenly left on March 15) and were winter residents only, while the city birds were pernanent residents. "The onset of maturation in the starling is almost certainly conditioned by the increase of daily light in the early months of the year, and it would appear that these two types of birds possess different reactions to the same environmental changes. The British birds react early and do not migrate. The Continental birds react more slowly and migrate before reaching their full sexual development."

40. Male Behaviour of the Female Starling in Autumn. W. S. Bullough and R. Carrick. 1940. *Nature*, 145 : 629. The yellow bill color is induced by male sex hormone. In October the bills of both sexes begin to turn yellow and both sexes sing. "Although in the breeding season the male alone sings, in autumn the habit is also developed in the female." This was checked by collecting singing Starlings. The authors compare this behavior to that of the female Redbreast that may hold territory in fall, and also to the singing of female Canaries that were injected with male hormone. Resident male and female Starlings (not winter resident) sing in October and November; in February the male begins again. "At this time the ovary is growing and is probably secreting female sex hormone

in such quantity that any effect on behaviour due to the presence of male sex hormone is obscured."

41. Light and Molt in Weaver Finches. Frank A. Brown, Jr. and Marie Rollo. 1940. *Auk*, 57 : 485–498. Equatorial Whydahs and Weavers, *Steganura*, *Pyromelana* and *Vidua*, were induced by daily light periods of 16 hours to come into nuptial plumage during their first year instead of second year as is normal. These birds "can be kept in nuptial plumage and breeding behavior throughout the year" by exposure to light. Different intensities of supplementary light affected the type of feather regenerated.

CENSUSES

42. The Midwinter Distribution of the Crow in California. John T. Emlen, Jr. 1940. *Condor*, 42 : 287–294. A survey, based on observations of over 1,000 persons, of the winter population of 1937–38 of *Corvus brachyrhynchos hesperis* in California showed some 82,000 Western Crows in 68 population centers. It was found that "wintering crows adhere year after year to a rather definitely prescribed range despite the presence of preferred foods, cover, water and other attractive environmental features elsewhere. It is not likely that the birds have simply failed to discover these apparently suitable areas beyond their range, for crows migrate through and even nest on many of them. Some definite restraining factor seems to be involved. It is conjectured that this factor is an innate drive to return each winter to established (familiar) territory."

43. Bird-Lore's Fourth Breeding-Bird Census. J. J. Hickey. 1940. *Bird-Lore*, (42 Suppl.) : 474–492. Thirty-five censuses are given, usually for three years in succession, one for nine; these are grouped under bogs and marshes, fields of various types, coniferous woodlands, maple-beech woodlands in Ohio, and other deciduous woodlands. A mine of valuable information.

44. Bird Population Studies. The Avifauna of Fort Jameson, Northern Rhodesia, 1935-38. J. M. Winterbottom. 1940. *Journal of Animal Ecology*, 9 : 68–75. The author considers that "techniques of sample counting and daily lists of species afford reliable indications of the relative abundance of individual species in different places and at different times." Data are analyzed according to Raunkaier's formula.

45. A Bird Census on Taranga (The Hen). E. G. Turbott. 1940. *Emu*, 40 : 158–161. A count from November 25 to December 4 of land birds on 75 acres of this forested island near New Zealand gave a total of 273 pairs of 17 species, or a density of 728 birds per hundred acres.

ECOLOGY

46. Ethology as an Assisting Science to Ecology. ("Die Ethologie als Hilfswissenschaft der Oekologie.") N. Tinbergen. 1940. *Journal für Ornithologie*, 88 : 171–177. A report of a lecture given at the meeting of the German Ornithological Society. An animal's relations to its environment are influenced by its behavior. Problems of the choice of food are discussed: what the species eats; what the relation of this menu is to the general food supply; protective coloration; warning colors; mimicry; etc. Inborn patterns are filled in by experience. Many experiments are cited on birds and evil-tasting insects.

47. The Status of Migratory Game Birds: 1939-40. 1940. Bur. Biological Survey Wildlife Leaflet, BS–165 : 1–22. In January there were some 65,000,000 waterfowl in the United States, nearly two and a half times as many as in 1935, but still far below the numbers earlier in this century. "Alaskan

nesting grounds are still greatly underpopulated . . . drastic regulations, including curtailing baiting and using live decoys, have borne fruit." The duck population of Mexico was much below that of the previous winter and far below the potential carrying capacity of the country. There is little starvation of ducks except those that are crippled, parasitized or suffering from lead poisoning. One fourth of the total annual kill are crippled, largely due to long range shots. Natural enemies are usually of little importance.

Woodcock suffered greatly from the severe winter; populations decreased 37.5 and 40 per cent over those of 1939. The same was true of Mourning Doves in the southeast. "Literally thousands of dead doves were found, apparently victims of starvation and cold." With this species nesting is active during September over most of the southeastern region. Shooting should not start before October 1 "for all areas south of the 36th or 37th parallel."

48. The Birds of Lord Howe Island. K. A. Hindwood. 1940. *Emu*, 40 : 1–86. Situated about 450 miles northeast of Sydney, Australia, this was an early bird paradise populated by fearless endemic birds. In the 150 years since the discovery of the island eight species have become extinct. The Lord Howe Pigeon, White Gallinule, and a Parakeet were exterminated by man; a Flycatcher, Fantail, Vinous-tinted Blackbird, Robust Silvereye and Lord Howe Island Starling were exterminated by rats that came from a wrecked ship in 1918.

49. Birds of Anaho Island, Pyramid Lake, Nevada. Richard M. Bond. 1940. *Condor*, 42 : 246–250. Examination of fish regurgitated by White Pelicans (*Pelecanus erythrorhynchos*) showed that these birds "are no more harmful to the fishing in Pyramid Lake than they were in 1924." Brown Pelicans (*Pelecanus occidentalis californicus*) were more concerned over their young than were the White Pelicans.

50. The Great Horned Owl and Its Prey in North-Central United States. P. L. Errington and F. and F. N. Hamerstrom, Jr. 1940. *Agr. Exp. Sta. Iowa State College Research Bull.*, 277 : 757–850. A detailed study of the food habits of *Bubo virginianus* partly based on six years' experience with 84 nests and the examination of 4,815 pellets. The authors conclude: "On the whole, it seems doubtful if north-central horned owls and associated predators exert a dominant influence upon populations of prey animals taken. The predators, even in numbers as great as many may themselves tolerate or can maintain locally, seldom appear to utilize more than a small proportion of the staple foods, i.e., rabbits and mice, conveniently available to them and, as a rule, turn to other mammals or to birds when these temporarily become more available than the prey staples. Overpopulation of habitats by nonstaple prey species has been accompanied by some of the most pronounced rises in representation of these types in diets of such flesh-eaters as the horned owl; crises precipitated by weather, destruction of environment, human activities, etc., were often reflected, as well, by response of predators to increased vulnerability of given prey animals." A paper that will well repay careful study.

51. Seasonal Food Habits of the Marsh Hawk in Pennsylvania. Pierce E. Randall. 1940. *Wilson Bulletin*, 52 : 165–172. By means of pellet examination at roosts of *Circus hudsonius* and by tethering of the young, it was found that mice were the staple food for ten months, while juvenile birds were taken freely in June and July, in connection with exposure by mowing and harvesting. The effect of the Marsh Hawk upon Pheasants is negligible; on the whole this species is a "decided asset to an agricultural community."

52. How do Large Raptorial Birds Hunt Their Prey? Willoughby P. Lowe. 1940. *Ibis*, 14th ser., 4 : 331–333. Instances are given from African species: harriers picking up flying fishes on the Red Sea; African Harrier-Hawk (*Gymnogenys*) clinging to tree trunks to get grubs from beneath the bark ro

stalking locusts and giving "a series of huge jumps before gripping the insect in its claws."

53. How Do Larger Raptorial Birds Hunt Their Prey? R. Meinertzhagen. 1940. *Ibis*, 14th ser., 4 : 530–535. Golden Eagles "usually hunt in pairs and cooperate in tactics." They "pounce without checking, even when the victim is on the ground." On the Victoria Nyanza Fish-Eagles (*Haliaeetus vocifer*) rob the Ospreys (*Pandion*) of their fish, but also fish for themselves. Though larger Raptores always attack prey much smaller than themselves, "some of the smaller Hawks will attack objects much larger than themselves." A cock Sparrow-Hawk (*Accipiter nisus*) ragged a cock Capercailzie (*Tetrao urogallus*), which "struck the most astounding attitudes with neck-hackles and tail to impress the Hawk. But the Sparrow-Hawk was not impressed and continued his attacks."

54. Northern Great Plains Region. The Season. C. J. Henry. 1940. *Bird-Lore*, 42: (Suppl.): 469–470. Great mortality from hail stones was suffered by Ducks, Coots, Franklin's Gulls and Pelicans. There was also loss from botulism. "Gull Island in Medicine Lake is a natural island composed principally of gravel and rock, and comprising approximately an acre. Eight-hundred and twenty nests of eleven species of birds were found on the island this summer, making a nest density of one nest per two square yards."

55. Minnesota Region. The Season. Thos. S. Roberts. 1940. *Bird-Lore*, 42 (Suppl.): 467–469. A pair of Cardinals were killed by arsenical poisoning after an orchard was sprayed; arsenic was found in the livers. A Pheasant nested 21 feet up in a mulberry tree in an old nest of another species; five of the eight young were "killed by the fall to the hard earth." Twelve species are mentioned as extending their ranges northward.

56. Reflections on Bird Protection—the Neglect of Habitat Preservation. D. L. Serventy. 1940. *Emu*, 40 : 153–158. "The essence of bird conservation should be . . . habitat preservation first and foremost. . . . In the past naturalists have been altogether too complacent in regard to the thoughtless destruction of natural cover which has been allowed to go on for so long under the name of progress." "The smallest units of natural cover, such as single trees, or narrow strips of scrub alongside a road, should be defended against the tampering of those well-intentioned but dangerous people, the civic 'improvers' whose dream of the ultimate in surburban beauty is strips of lawn and bitumen."

BOOKS

57. A Waterhen's Worlds. Howard Eliot. 1940. Cambridge University Press. (N. Y., Macmillan). 84 pp. $2.50. An intimate study of territorial and nesting behavior in *Gallinula chloropus*. Mr. Howard's problem is that of analyzing the bird's mind. He discusses four "worlds" of perceptions—Territory, Sexual, Platform and Family. I will quote from the chapter on Platform World:

"They collect stuff early in February and finish in the middle of April. Nine weeks they spend with their heap of stuff: hour by hour they devote themselves to it . . . the cock is chief murmurer, chief builder, chief sitter. . . no Waterhen crows on his platform: he murmurs in a particular way, lays his head on the platform, nibbles his mate's head, and offers his own to be nibbled." p. 41.

The birds are silent while incubating, but murmur again when the chicks hatch. "When he squats and murmurs he is doing something, and the something is related to the young. Let me consider these two points settled. But since six weeks will pass before an egg is laid; squatting and murmuring are manifestly ahead of their time." p. 53.

We are given very little in the way of statistics on nesting routine. I will quote from Family World:

"Sometimes I think the time of change is inwardly determined. It is not a matter of chance, not five minutes now and now fifty. But whether it is exactly determined, as the frequent thirty-eight minutes which my watch reports would have me believe, is still in doubt. At any rate they change, and do it regularly." p. 56.

"Twenty days they sit. But to-day, the eighteenth day, there is a change—they hurry. Formerly when one left the nest it left to feed, or preen, or wash, doing all things at normal speed; all things now are done hurriedly. There is a particular kind of hurry which signals directed action; but not the kind I see now, not quick movements anywhere and everywhere as if there were little time to spare. Is that strange? Well, yes. To behave as if the young were out two days before they are due, and for both of them to do it, is strange. To-morrow there will be no hurry, the next day much; for when the young begin to hatch they begin to hurry." p. 57.

A charming account of family life follows, to my mind the choicest part of the whole book. Here is a sample:

"Brooding is a feeling which depends not upon the sight of the nest or the feel of it, nor upon the sight of the young or the touch of them. For see, now that the young are a fortnight old and run about the field to tug worms, how the cock, at a distance, sinks down in a hollow, preens and pretends to preen, and broods the grass; and how the young, when they see him do this, run and burrow beneath him." p. 59.

A Waterhen's Worlds is not easy reading. Nevertheless the book is well worth careful study, both for the sympathetic account of the life history of the Waterhen and the thought-provoking presentation of problems of bird psychology.

58. Audubon's America. The Narratives and Experiences of John James Audubon. Edited by Donald Culross Peattie. 1940. Boston. Houghton. $6.00 An extraordinarily interesting picture of American pioneer life is presented here—the best stories form Audubon's "Delineations of American Scenery and Character," from his "Mississippi and Ohio Journals," and his diaries of his trip up the Missouri, his experiences in New England and New Orleans, and his explorations in Florida and Labrador; each chapter preceded by an illuminating and sympathetic introduction by Mr. Peattie. There are selections from the "Quadrupeds" and the four life histories of extinct birds. Mr. Peattie tells us:

"And the materials of history are, in the last analysis as in the first place, the accounts of eye-witnesses. . . . Now of all those who ever lived here, traveled and greatly adventured, none could bear more fascinating testimony than John James Audubon. He had the advantage of being a foreigner. . . . So that he took nothing for granted, and in the perspective of a more mature culture, all things American struck him as fresh. He had the further advantage that he was a genius, and a genius of art at that, so that to observe, to depict what he saw, was habitual and instinctive.

"But Audubon had, too, a genius for the art of living. He lived with zest for the adventure, and with personal ardors. He savored everything, even the unsavory. He saw almost everything, from 1803 to 1849, from Florida to Labrador, from New York City to Fort Union on the borders of Montana."

This is a superb volume, in its make-up, its splendid reproductions in color from Audubon's paintings (seven from the Quadrupeds), its thrilling narratives and its masterly editing.

Wings at my Window. Ada Clapham Govan. 1940. N. Y. The MacMillan Co. pp. I–XIV.+ 198. $2.50. As we read the pages of "Wings at my Window", we hear a lady's voice telling us a fascinating story. At first it is a sad story, and her voice is full of the pain she suffers, for she in an invalid. Then the voice quickens and grows happier as birds come to her window, and a great,

new interest enters her life, and the love of birds drives away her pain, and she becomes well again.

That is Mrs. Govan's story, and she tells it admirably. Physicians and psychologists will accept it as literally true, and when she speaks of her birds, all who are interested in ornithology will be charmed.

Mrs. Govan makes very modest claim for her knowledge of birds. Indeed she says that most of her studies have been made from her window. With little aid she established a feeding-station in her back yard, and during the past few years has fed thousands of birds there. When she had learned to identify the birds accurately, she began to band them and has obtained remarkable results of true scientific importance. This, in a word, is what Mrs. Govan has done at her home —no small accomplishment. But in a broader field, through her writing in newspapers and magazines, she has stimulated an interest in birds among a multitude of readers, and now, in "Wings at my Window", summarizing her experience of half a dozen years, she is spreading her message still farther.

Mrs. Govan writes with engaging, contagious enthusiasm. Her story sweeps along, enlivened both by her vivid, sparkling style and her gift of apt description —almost a "trick of singularity", e.g. the woodpeckers' "tails that were natural camp stools", p. 26. All through the book her love for birds shines out, often for a single banded individual which has been her friend for years. Apparently as a result of her warm affection for them, some of the birds become very tame, and she, alone of all bird-banders, is sometimes able to band birds without trapping them, by taking them gently into her hand. One passage relates a remarkable experience of having a roomful of pine siskins day after day in her bedroom.

Flashes of delicate poetic writing charm us as we read along. As an example on page 50: "Twice each day throughout June and July a shy nymph emerged from the woodland for her bath. I could almost hear the rustle of crispy starched petticoats as my little Oven Bird came stepping through the Tangle she loved so dearly. Then, discarding her demure demeanor as she would have laid aside her petticoats, she splashed the happy moments away—a dryad of the woods at play within ten feet of my window."

Mrs. Govan's sense of color is so discriminating and exact that she makes the whole book glow. Her word picture of a female purple finch, as she holds it in her hand, is a masterpiece of delightful description.

"Wings at my Window" contains a great deal of information about birds, and gives much sound advice about feeding them, but above all it is a book to read again and again for the joy of reading lovely English prose.

Here and there is a hint of fear that the adjoining woodland will be sold as house-lots and thereby destroyed as a cover and breeding-ground for Mrs. Govan's birds, but in the last chapter she exultingly tells us that through the intervention and aid of her many friends and readers, the woodland has been rescued and made into a permanent sanctuary.

The final scene shows Mrs. Govan standing at dusk in her sanctuary, with a flock of migrating Hermit Thrushes all about her. She says: "At once the soft, throaty notes rose on every side, enclosing me within a magic circle, though I could not distinguish even one dappled breast in that hallowed dusk. Perhaps the feathered throng were only voicing reproach for my intrusion—but in my heart I knew that they, too, were saying: 'Thanks, Lord! Thanks!' "—WINSOR M. TYLER.

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